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Improvement in Shingle Machines.

Many attempts to produce a shingle machine that will make shingles with a smooth surface like shaved shingles, and do the same rapidly and economically, have been made, and some partial successes have been achieved in this line. The machine herewith illustrated makes a compromise between sawed and shaved shingles by planing the side designed to be laid uppermost, and as the weather side of shingles is the only one which is required to be smooth, if the other is flat, this compromise will probably prove acceptable to the trade, provided the shingles are in other respects all that could be desired.

We have seen a sample of the shingles, and will say that we think them a very superior article, although we cannot vouch that all shingles made by the machine would correspond with the sample shown to us. We see no reason, however, to suppose that they would not, provided the timber from which they are made is of the proper quality.

The engraving shows the machine in perspective, and we shall content ourselves with such a general description as will exhibit the principle upon which the machine operates.

The cutting is done by a circular saw, A, and plane knives set in the planer head, B. The machine receives motion through the main driving pulley, E, and motion is transmitted to the planer shaft by a belt running on the pulleys, C and D.

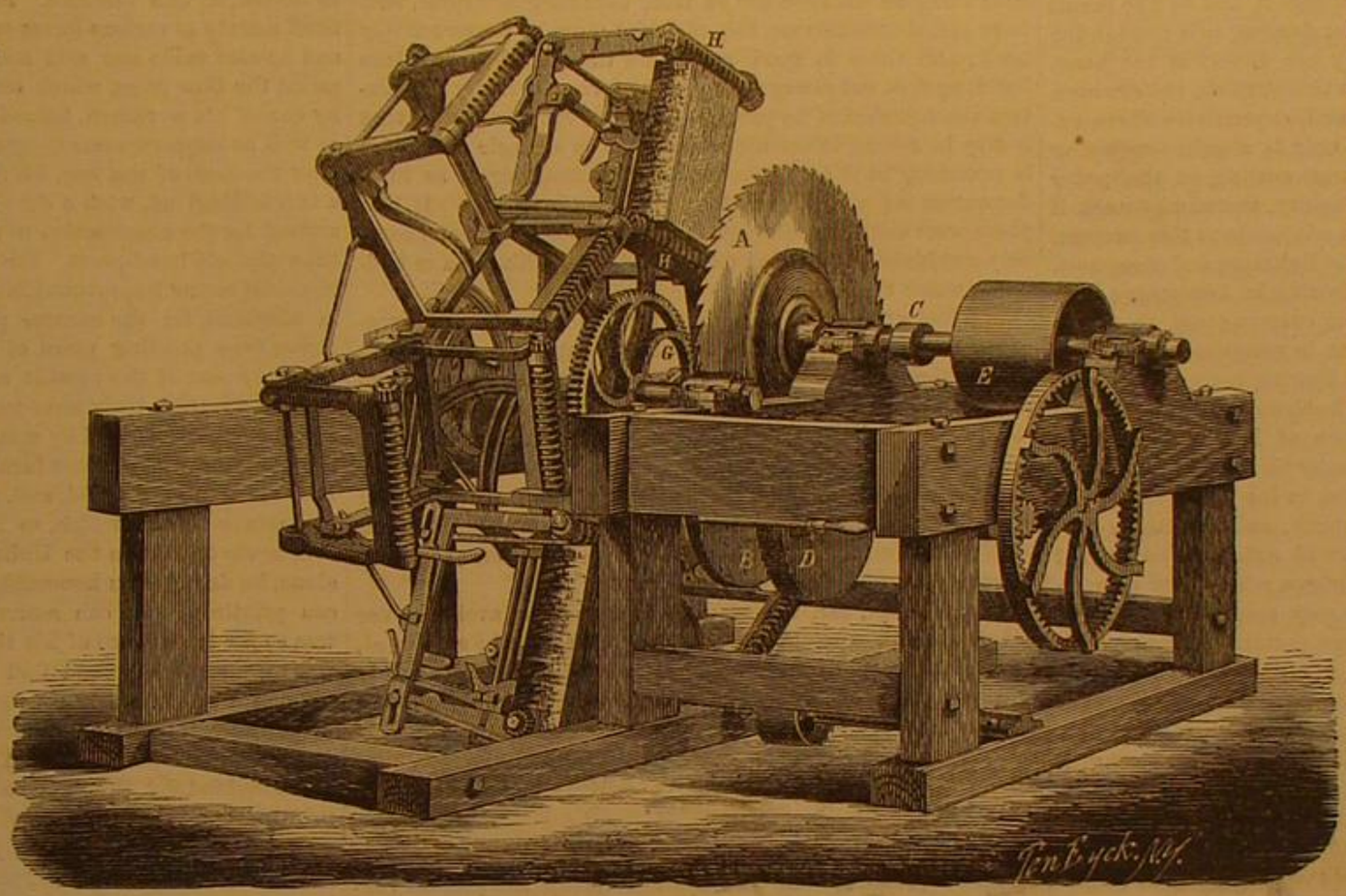
A pinion on the end of the planer shaft imparts motion to the gear, F, which, through a pinion fixed to the opposite end of its shaft, revolves the gear, G, fixed to the shaft of the bolt carrier, bringing the bolts successively over the planer and saw as required.

The bolts are held by spurred rollers, H, which are driven by a ratchet and pawl movement, actuated by a vibratory lever, which alternately feeds forward the top and bottom rollers, so that the proper wedge shape of the shingle is obtained.

The feed rollers are placed at the ends of clamping arms, I. The upper pair of each set of clamping arms is held by a lever cam which locks the apparatus, and holds the bolt firmly to the work.

By these devices the surface of the bolt is first planed, and then being brought to the saw a shingle is cut off. We are informed the machine operates with great rapidity and with but little more consumption of power than the saw would alone require.

Patented April 13, 1869, by Merrill Chase, Jr., and Horace J. Morton, of South Paris, Me., assignors to themselves and Freeman C. Merrill of the same place, where the machines may be seen in operation, and the working of which is said to be very satisfactory. For further particulars address Merrill & Morton, at the above-named place.



CHASE AND MORTON'S SHINGLE AND HEADING MACHINE.

The Dangers of Ballooning.

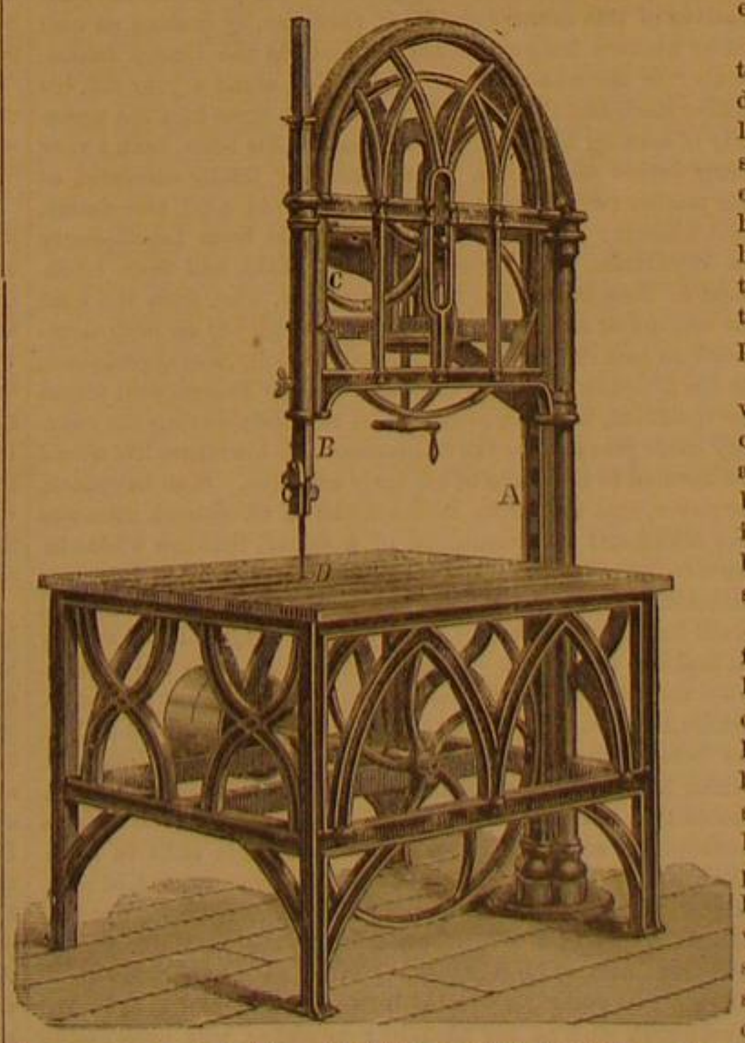
The London *Star* furnishes an interesting account of some of the dangers that must attend all attempts to navigate the air. A Mr. Youens recently undertook an ascent near Huddersfield, in the Aerial, which is capable of holding 20,000 cubic feet of gas. It rises to a hight of fifty feet, and expands to one hundred feet in circumference. Away floated the balloon in a westerly direction, oscillating for a considerable distance in a most extraordinary and unusual manner. M. Youens experienced a stronger breeze than he had anticipated, and, the current changing rapidly, his energy and knowledge as an aeronaut were very closely taxed in the management of the balloon. A fresh current drove the Aerial to the east for a time, but presently another gust, unexpectedly, in the direction of Halifax, thence towards Bradford, in a northerly course, and after the lapse of twenty minutes, the Aerial and its occupant pierced the clouds.

Mr. Youens then began to make observations for the purpose of selecting a suitable site on which to descend, and in a few minutes concentrated his attention upon a field in which a fête was being held. The breeze, however, carried the Aerial some three miles further, and a second time Mr. Youens attempted to lower himself in a field adjoining some farm houses at Denholme. Cautiously opening the escape valve, Mr. Youens continued the journey downwards and threw out the grapnels. Impetuous blasts of wind increased the difficulty of bringing the Aerial to anchor.

A strong wind prevailing, the balloon became unmanageable, and drifted over fields and stone walls with amazing velocity. The flukes of the grapnels penetrated the ground and uprooted the earth as they followed in the wake of the balloon, while the aerial chariot dashed onwards, making, in its career, wide gaps in several stone walls. Mr. Youens, preparing to encounter the worst fate, wrapped the end of the cord which opens the escape valve round one of his wrists, and burying himself in the car, permitted the balloon to proceed until the breeze subsided; when, after the car had been thrice capsized, and every article which it contained thrown out, Mr. Youens, who received no injuries, anchored, and completed a voyage of many miles, occupying half an hour in its accomplishment.

PLASS' PATENT SAFETY BAND-SAW.

It is usual, in band-saws, to place the saw outside the frame and column which support the driving parts, thus exposing



the saws to injury from handling lumber about them, also rendering them dangerous to the operator either from breakage of unsound saws, or by the saw sliding off the upper pulley while in motion and falling upon the operator, from which accidents have occurred. The main feature in this machine has been to produce a band-saw perfectly safe to the operator, and fully protected from injury to the saw—combining neatness and utility in all its parts.

By reference to the annexed engraving it will be noticed that the saw is placed to run upward inside the column, A, under the top arch, over the upper or tension pulley, and down inside the front frame and behind the guide bar, B, which can be adjusted up and down to the required hight for the work to be done. The saw also runs through a superior adjustable guide above and below the work, and a guide in the column near A, guiding equally well all widths of saws. The upper or tension pulley is entirely inclosed by the gate, C, which opens to change the saws, and perfectly protects the operator from the saw in case of breakage or sliding off. The upper pulley shaft is held in oscillating, yielding, and adjustable bearings, that can easily be set to accommodate the running of the saw.

Manufactured by the inventor, J. T. Plass, at his iron-works, Nos. 202 and 204 East 29th st., New York, where they can be seen in operation.

Malleable Cast Iron.

For the production of this material, says *Van Nostrand's Magazine*, most of the German founders use first fusion pig free from sulphur and phosphorus, or Scotch pig. Styria also furnishes a suitable iron, which can be used only in the north of Germany, however, on account of the expense of transportation and high duties. On account of the competition of wrought iron, great cheapness is very essential to its sale.

The makers keep secret the brand or grade of iron which they employ, but it is well understood that the brands are not the same in different establishments. The iron is melted in plumbago crucibles, holding about 30 kilogrammes. They are covered with porcelain lids to keep out impurities and cinders, which reduce the high heat requisite for the process. The fire in which the crucibles are placed, is from ·630 m. to ·940 m. square, and is surrounded with bricks of porcelain earth.

The use of blast is not advantageous, since the economy of time is offset by a greater consumption of coke. The natural draft of the chimney is sufficient when the furnace is properly constructed. As we have said, an essential condition of success is a high heat at the moment of pouring. Practice enables the founder to estimate the heat of the furnace, and he recognizes the precise moment by plunging a bar of red-hot iron into the crucible, from which, upon being withdrawn, the metal flies off in sparks. The crucibles are raised with tongs, with curved jaws, and the pouring is done with all possible promptitude—the surface being first cleaned.

By cementation the casting acquires the properties of wrought iron, having some analogy to steel. The operation consists in subjecting the castings to a prolonged red heat, in a bath of pulverized red hematite. They are arranged in boxes of cast iron called muffles. It would seem that the cylindrical form ought to be most advantageous for the boxes, but practically they are simply square, and with covers which should keep out entirely the least access of air.

In arranging the castings in the boxes they are placed in fayers alternately with layers of hematite. The cementing furnace is very simple. The grate is in front, and the draft of the chimney carries the hot air around the boxes. The heat should be conducted with care, starting rather vigorously, in order to reach quickly the desired temperature; then supplying the furnace at regular intervals. The cementation lasts three, four, and five days, according to the size of the pieces. A charge is about 350 to 450 kilogrammes of castings. In arranging the charges large pieces should not be mingled with small, and those muffles containing the larger pieces should be placed in the furnace first. On the other hand the smaller objects are placed on the sole of the furnace. Without these precautions many pieces may be burned, or badly decarburized—the latter becoming something intermediate between iron and steel. When the operation is deemed complete, the fire is allowed to fall, but the furnace is not un-

charged until it has gradually cooled. Practice plays an important part in the management of the firing, as the temperature can be judged of only after prolonged experience. Next to the fuel, the greatest expense is the cementing boxes, which are often serviceable only for a single operation.

AMERICAN INSTITUTE OF ARCHITECTS.--FIRE-PROOF CONSTRUCTION.

(Concluded from page 114.)

We conclude our review of Mr. Wight's paper on "Fire-proof Construction," published by the Committee on Library and Publications, a portion of which was given in our last issue.

"The objections to the brick arches are, that their great weight requires heavier beams than would otherwise be used, and that the form of their soffits is not beautiful, for they have the appearance of a long succession of little wagon vaults, requiring a resort to the doubtful expedient of furring the ceiling with iron lath. I think it might be objected to the French system of floors, that the expense would be too great, plaster being a dear article with us in comparison with its price in France, while our own cement has not the requisite properties to enable it to be substituted, besides being almost equally costly. The stone slabs of Mr. Eidlitz, are the only rigid material thus far used successfully with iron beams, and could be used to better advantage if laid *on* the beams rather than resting upon their lower flanges, as is done in the American Exchange Bank. They are doubtless the handsomest material that can be used for this purpose, but are open to the objection of being heavy and expensive—where expense is a question, and utility only is sought—requiring heavy beams and calling for elaborate cutting on the under side. It will be pertinent to our inquiry, therefore, to ask if there are any other rigid materials adaptable to this purpose, and possessing the desired quality of lightness and cheapness. Cast-iron plates may be used for flooring in two ways; first, when deafening and finished floor covering are required; second, when neither is required, as in manufacturing buildings, wherein a reasonably smooth flooring is required, and a few planks, laid where workmen habitually stand, will answer the purpose of non-conductors of heat. Experiment must determine the minimum quantity of iron (in proportion to the strength required), to be used in the floor plates. In obtaining the proper form for strength, and to insure true castings, the bottoms of the plates will naturally be covered with raised flanges, except at the edges, where they bear on the beams. These flanges or ribs may assume a decorative form, either a plain diaper or larger pattern to form a complete design for the ceiling when many of them are combined. By a judicious arrangement of the flanges the actual thickness of the iron may be reduced to three eighths or a quarter of an inch. When deafening is required, strengthening flanges may also be cast on top of the plates, and consequently the beams can be placed at wide intervals. The flanges on the top will then serve to keep the concrete, used for deafening, in its place, and avoid the cracks which might occur in a large surface of cement. The deafening may be of any thickness required, and will serve as a bed for the floor tiles. All that is then required for the under side is judicious decoration of the beams and floor plates. When deafening is not required, as in manufacturing buildings, the tops should be smooth. It has been objected that the floors of iron would be too cold for the feet of workmen. But it would be very easy to put down platforms of wood where the men habitually stand. Besides, when the lower story is heated, the stratum of hot air immediately under the ceiling would naturally keep the floor at a higher temperature than that of the air in the room, and the greater conductibility of the iron would rather tend to warm the feet of those who stand upon it. The plates, in all cases, being bolted to the flanges of the beams, would serve as bridging for the floors.

"Where decorative effect is desired, stone with marble panels is recommended. Our native quarries now afford stone light enough in color to set at rest all objections that may be made to its use on the score of light. But if those should hold good the material might be marble paneled with marble, the former white, and the latter colored. Obviously the cheapest material for wall covering in natural materials would be slabs of white marble. Let us then make some comparison of figures, and see what can be done with this material. Iron lath, of the form generally used, cost $1·25 per foot. Three-coat plastering costs nine cents per foot. A responsible dealer in marble informs me that he will put up inch slabs of Italian veined or Vermont marble for one dollar and a half per foot. Which, then, would you choose, polished marble at $1·50, or plaster, as good in appearance as that in any tenement house, at $1·34? This is a fair comparison for exterior walls or ceilings. Italian marble slabs can be procured in any quantity, from eight to nine feet long and three feet wide. In a room fifteen feet high, allowing four feet for wainscot and two feet for cornice, you may line your walls with one length of marble.

What treatment do we now give to doors? We build brick jambs with wooden or iron lintels, as if we would trim the doors with wood. We then put up cast-iron jams, rivet to their edges pilasters or architraves of the same material, and then surmount the whole, perhaps, with a cast-iron cornice and pediment. Some have gone so far as to inlay the panels of the iron work with bits of colored marble, thus heightening the effect of the already rough finish of the iron, a roughness which the best founderymen have been unable to prevent, and which it would cost untold money to reduce down to the smoothness of ordinary work in pine wood. In one of our most pretentious houses on Fifth Avenue, they are now putting up jams, architraves and cornices made of sawn slabs of marble or marble boards, in the same manner in which wood and iron have been used. And what does all this amount to? In the category of shams, there is no equal to this monstrous succession. You have imitated a Greek or Roman architrave and cornice by a wooden sham, your wooden sham has been imitated by an iron sham, your iron sham has been imitated by a marble sham. And what is the result? You have kept the form all along; you have come back to the original material by a succession of imitations, and have at last a shell without meat—marble carpentry instead of marble architecture. In all the stages of your attempt to revive the old forms, you have sham imitation of shams down to the final achievement of your carpenter in marble.

"In erecting modern fire-proof buildings, especially in so far as iron work is concerned, all the conditions imposed upon the architect are different from those which existed in past ages. The same may be said of the use of iron in any building. Subserviency to style, when the material used is not such as was the controlling element of that style, is destructive to all good art; for there can be no truly artistic effect except that which is produced by the best use of material, and its decoration in best accordance with its nature. If the use of iron is ever to lead to the erection of buildings worthy of being called works of art, such a result must be attained only by the recognition of this principle.

"The best thinkers have doubted whether there can be any such thing as architecture in iron, assuming of course, that to be called architecture, the material must be constructively used; and there is good reason for these doubts. An iron building does not always require the force of gravity to maintain the cohesion of its parts; it possesses such properties that it may be swung in the air or balanced on a single point, if it is necessary so to do. It is a machine admitting of as little decoration as a steam engine or a printing press. If iron alone were used for buildings, constructive necessity and economy combined, might lead us to build houses like steam boilers or water tanks."

In a foot note Mr. Wight states that an inspection of Harper & Brothers' building, since writing this paper, has convinced him that the principle of division into horizontal compartments has been carried out more thoroughly in it than in any other building of the kind. There are no openings through the floors. It contains neither interior stairs nor hoistways—both are on the exterior. The stairs are in an isolated tower approached by bridges, and the hoistway is without inclosure. This arrangement is, however, extremely inconvenient.

In conclusion, Mr. Wight urges architects to avoid the use of iron whenever possible so to do; but if it must be employed, to use it rationally and constructively, without attempt to imitate styles not in harmony with its constructive properties.

THE EARLY AMERICAN IMPROVEMENTS IN PRINTING PRESSES.

Few men have borne a more important relation to the wonderful progress made in this country, during the present century, in the improvement of printing presses, than Phineas Dow, of this city. Although now nearly ninety years of age, his mental and physical faculties are in a remarkably good state of preservation, and he affords a new illustration of the trite maxim that men are more apt to rust away, in idleness, than to wear out in good service. His career also illustrates not only mechanical genius of a high order, but extraordinary versatility and the happy faculty of turning a cunning hand to varied employments.

Phineas Dow was born in November, 1780, in Londonderry, a town in New Hampshire, named after the famous Irish locality which bears the same cognomen. His parents were both natives of this country, and he is, therefore, by descent, as well as by his own long-continued residence in the United States, truly "to the manor born." When but about a year old, his father died, and this misfortune imposed upon him the necessity of earning his bread by the sweat of his brow, from a very early period of his life. The surviving family consisted of his mother (who lived to reach a green old age), two sisters, and himself; and after various removals, from Londonderry to Wyndham, from Wyndham to Litchfield, and from Litchfield to New Boston (N. H.), young Dow, who, from the time he was six or seven years of age, was employed on such farm-work as best suited his strength and capacity, was apprenticed, in his fifteenth year, to a carpenter in New Boston, with whom he remained, working steadily and skillfully during the ensuing three years, under the impression that his future life would be devoted to the trade of his early adoption. It so happened, however, that the talent he displayed in wood-work attracted the notice and commendation of a friend, through whose influence he secured, at the age of eighteen, a more lucrative situation as a coach maker, at Salem, Mass., where he remained until he was about twenty-three years of age, employed mainly in making the bodies of the chaises, which were the fashionable vehicles of that period. About 1803 he went to Boston, where, after working some time as a journeyman coach-maker, he became the proprietor of a coach-making establishment, which he successfully conducted, until the war of 1812 prostrated that branch of industry, and compelled him to seek remunerative employment in a new field. His skill in wood-work well qualified him for the task he then assumed, of making the elaborate cabinet carving which was then required for the decoration of the furniture used by the wealthier classes, and this business he continued up to the time the war closed. During this period, he was the intimate acquaintance of Daniel Treadwell, who, as his next-door neighbor, was prosecuting his trade as a silversmith, under serious disadvantages, occasioned by the pressure and distress arising from the war. Dow and Treadwell, in conjunction, employed their leisure moments in efforts to construct a new machine for making iron screws, for which a great demand then existed, on account of the gradual consumption of the old supplies which had been received exclusively from England. Just as they were about perfecting their device, the sudden termination of the war overwhelmed their enterprise in the ruin which attended many similar efforts to supplant foreign products, for they were unable to compete with the British manufacturers, whose fabrics deluged the American market as soon as it was re-opened. Baffled in this direction, Mr. Dow, combining the knowledge he had acquired in their experiments with his previous acquaintance with various branches of mechanics, started a machine shop, where machinery of all kinds was repaired or manufactured, and it was as a machinist that he first established the connection with printing presses which has continued during the last fifty years of wondrous progress. Mr. Dow paid special attention, in his machine shop, to fire engines, and displayed such skill that he received all the patronage in the gift of the city of Boston, together with the compliment of the Mayor that his improvements were worth far more than the amount of his bills, and the appointment of official inspector of all the fire and steam engines in the city. While he was repairing, making, and improving fire engines, he was equally ready to execute orders for other descriptions of machinery, and, as it fell within his province to repair old printing presses, his establishment became the head-quarters, in Boston, of this business. For a time his efforts were confined mainly to various forms of the old-fashioned hand-press, and he also made and sold some ten or twelve hand-presses, called the Dow press, which embraced new devices, invented by one of his workmen, named Cooley (a half-breed Indian), as well as improvements suggested by himself. But not long after the close of the war, his friend Treadwell returned from a trip to England, with a firm conviction that the time had arrived for the construction of more rapid printing machinery than the old hand-press. His attention had probably been attracted to the improvements which were then still novelties in England, for the earnest practical efforts to construct a power type printing press, of any description, were made in the early part of the present century, and the London *Times*, of Nov. 28, 1814, truly announced that that journal was the first newspaper printed by steam-impelled machinery. From the plans and descriptions furnished by Mr. Treadwell, Phineas Dow made first a model, and, subsequently, a series of working power-presses, which, so far as is known, were the first ever made or used in the United States; and, for this service alone, he deserves an honorable niche in the history of American printing. We can scarcely realize that Mr. Treadwell was so far in advance of his time, that, after his power-press was completed, he could find no purchasers—no newspaper proprietor ready to venture upon the doubtful experiment of printing more than a few hundred copies per hour—no book printer anxious to secure such facilities!

Undaunted by this difficulty, Treadwell commenced the printing business himself, running his presses by horse power, but as soon as he was fairly at work issuing, with unprecedented rapidity, various popular books, his establishment was burned to the ground. The origin of the fire is not positively known, but the hand-pressmen of that day were intensely hostile to the new-fangled labor-saving invention, which threatened, in their judgment, the annihilation of their craft, and it was generally believed that this feeling had finally culminated in the destruction of the first power-press printing establishment of this country by an act of incendiarism. Thus the dawn of a great mechanical revolution was hailed by the indifference of employing printers and the deadly hostility of pressmen.

Mr. Treadwell, still undaunted, had other presses made, and for greater security, as well as to gain less expensive power, he established another printing office on the mill-dam, in or near Boston, where his presses were run by water-power.

Mr. Dow subsequently made for Mr. Isaac Ashmead, of this city, two of the Treadwell presses; and Mr. Ashmead was so well pleased with their operation that he had six other presses of the same pattern made by other machinists.

Mr. Treadwell's inventive genius was not confined to power presses or screw machines. He claims to have been the originator of the Armstrong gun, and Mr. Dow still remembers that, in 1814, Treadwell asked him what he thought of making a gun of "staves" of iron, and binding it together with iron hoops. Treadwell also invented, some years ago, a type-setting and type-distributing machine, as well as wrought nail and inking machines, which were made by Mr. Dow. Information in regard to the type-setting machine was surreptitiously given by one of Mr. Dow's blacksmiths to a man who went to England and had it patented there so promptly, that the real inventor, Treadwell, who had been tardy in his application, was denied a patent in this country.

While the Treadwell presses were being manufactured, Mr. Dow had in his employment, as journeymen, two men, who have since won imperishable renown, as well as a more substantial reward, for their useful improvements in printing presses—Seth and Isaac Adams—the inventors and patentees of the Adams press. They were originally cabinet carvers, and they were useful in the machine shop in making patterns, as well as in various other affairs requiring superior skill. Isaac Adams possessed great fertility of invention, while his brother Seth was a shrewd business manager; and this combination of talents secured their joint success in realizing large profits from the Adams press. Prior to their famous invention, and while they were still working for Mr. Dow, they invented a power press which was also called the Adams press and which attracted considerable attention. Mr. Dow made a number of these machines, and among other sales, he effected several in Philadelphia, including one to Samuel Coates Atkinson, of the *Post and Casket*; one to Joseph R. Chandler,

proprietor of the *United States Gazette;* and one to Jasper Harding, proprietor of the *Inquirer;* and while he was putting up these three presses, he effected sales to other Philadelphia printers and publishers.

Mr. Tufts, who subsequently invented and manufactured several presses of novel construction, was also one of the journeymen engaged in Mr. Dow's machine shop at the period when these important improvements were gradually being perfected.

While the journeymen of the establishment were busily engaged in preparing for the transition from hand to power labor, the inventive genius of the proprietor was not idle. In addition to his constant efforts to put into working order the models of other men, he labored steadily during his leisure moments, in conjunction with Mr. Sawyer, a cabinet maker, to perfect a power press that would make a simultaneous impression on both sides of the sheet; and after spending several thousand dollars and much time in completing a machine of this description, his efforts were apparently about to be rewarded with success, when a destructive fire consumed his whole establishment, and as it was totally uninsured, all the fruits of years of hard labor were suddenly swept away.

Immediate necessities compelled Mr. Dow to turn his energies in a new direction. For a time he was in doubt how to make his new start in life, and while he was gaining a temporary support at his former trade of cabinet carver, he made a piano which, after more than thirty years of hard service, is still in good condition, and it affords one of many existing proofs of the versatility of his mechanical genius.

After spending several years subsequent to the destruction of his machine shop in several places, Mr. Dow permanently established himself, in 1841 or 1842, partly at the solicitation of Mr. Isaac Ashmead, as a machinist, in Philadelphia, his shop being located in a part of the building now occupied exclusively by King & Baird's printing office. His superior knowledge of the machinery connected with power presses, which were then rapidly coming into general use, gave him, for a time, a monopoly of this branch of his business in Philadelphia, and made him "the doctor" of all the sick power presses of the city. After remaining in the King & Baird building for five or six years, he removed his establishment near Sixth and Arch streets, where, up to a very recent period, he continued his active business career, astonishing his numerous acquaintances by the unremitting intellectual and physical vigor displayed despite his near approach to the green old age of fourscore and ten.—*Printers' Circular.*

Dyeing and Printing.

At the present time, sumac is much used in dyeing and printing, in order to cause other dyes to take better on the fabrics or fibers of materials to be dyed or printed. According to an invention lately patented by Mr. J. L. Norton, of Bell Sauvage Yard, Ludgate Hill (whose name is well known in connection with the Abyssinian tube well), an extract of the bark of the hemlock tree is substituted for the sumac, the desired result being thus more effectually and economically attained. The following are the details of the methods by which Mr. Norton operates in order to obtain a number of different colors:

To dye 20 lbs. weight of cotton a magenta color, take 3 lbs. of Miller's extract of hemlock bark as imported from Canada, and boil it with 20 gallons of water, and then lay the cotton in the liquid for a night. In the morning, add 3 pints of red cotton spirits diluted with 20 gallons of warm water, and work afterward the cotton in this for 50 minutes. Then bring it out and wash twice with cold water, and afterward with warm water. Then take 20 gallons of fresh water heated to 160° and put two pints roseine solution into it, and work the cotton in this liquor till the color is full enough. Wash the cotton and dry it.

To dye a primula color, proceed as before, only using a solution of Hoffman's violet instead of roseine, and work at the same temperature (160°). A bluer tint may be obtained by increasing the heat, or a redder by lessening it.

To dye a lavender color, take of extract of hemlock bark 1½ lbs. to 20 lbs. of cotton, and work the cotton in the extract diluted with 20 gallons of water for half an hour. Rinse and wash in cold water, and then in warm. Take of red cotton spirits 1 pint, diluted with 20 gallons of warm water, and work the cotton in it for 15 minutes, then wash in two warm waters. Afterward work the material in a bath consisting of 1 pint of Nicholson's No. 2 blue solution, with 1 gill of nitric acid at about 100°. Wash the cotton and dry it.

To dye a green color, prepare with 4 lbs. of extract of hemlock bark mixed with 20 gallons of water. Lay the cotton in this for 1½ hour at a boiling heat; then prepare a bath with 20 gallons of cold water and 2½ pints of double muriate of tin, and work in this half an hour. Wring the cotton out and wash off well to kill the strong acid. Afterward take 20 gallons of water at a temperature of 170° or 180°, and put into it 1 pint, or nearly so, of iodine green paste diluted with 1 gill of methylated spirits; if a yellow shade is required add a little picric acid. Work the materials in this for about 20 minutes, then wash and dry it.

To dye a gold color, prepare with ½ lb. of extract and 1 lb. turmeric dissolved in 2 gallons of water. Work at a heat of about 90°, then cool down and add ½ gill nitric acid. If the color is not red enough, add a little annatto; if not deep enough, repeat until the shade required is obtained.

To dye black, take 4½ lbs. of extract of hemlock bark and boil it with 20 gallons of water, and then lay the cotton in this liquid for a night. In the morning take it out and put it into a cold lime water bath of 4°, and work in this for 10 minutes. Wring out and sodden with 15 gallons of old sumac liquor, 1½ lb. of copperas, and 2 gallons of urine. Work it in this for 15 minutes, wring out, and again put it into the lime liquor and work in it for 10 minutes, and then wring out. Afterward scald 6 lbs. of chipped logwood with 15 gallons of boiling water, and work in this for 20 minutes, and then give the cotton 3 turns in 15 gallons of cold water, in which 1 lb. of copperas has been dissolved. Soap it with 1 lb. of soap in 20 gallons of warm water, and wash off in cold water and dry.

To dye brown, proceed as above, only with 4 lbs. of the extract, and in the morning take the cotton out and work it for 30 minutes in 20 gallons of cold water, to which add 2½ pints of red cotton spirits. Then wash off in two cold and one warm waters. Then scald 7 lbs. chipped logwood with 15 gallons of boiling water, and let it cool a little, and then work the cotton in it for 30 minutes. Take the cotton out and add 1 lb of alum to the bath and work the cotton again for the shade required. Wash off in cold water, and dry.

By red cotton spirits is meant a compound of about 2 parts of aquafortis to 1 pint of spirit of salts, to which block tin is added for the purpose of killing it before using. The quantities directed to be used of the several aniline dyes are applicable to the usual commercial strengths.—*European News.*

A SIPHON FOR DRAINING A TUNNEL.

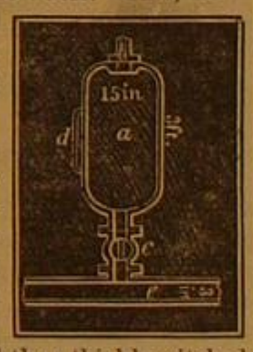
The tunnel through the Blue Ridge, in Virginia, is 4,273 feet long, and 700 feet below the top of the mountain; on this account it was thought expedient to construct without shafts. This tunnel slopes from west to east, at the rate of 70 feet to the mile, so that, on the west side, the water, which proved very abundant and troublesome, had to be removed by artificial means. For some distance at the entrance I determined to introduce a siphon of unusual length, which proved a difficult, and, at the same time, interesting experiment.

The whole length of the siphon is 1,792 feet, viz., 563 feet inside of the tunnel, and 1,229 feet outside. The level of the water inside is upward of 9 feet below the summit, and the fall outside 29¼ feet, so that the head is a fraction over 20 feet.

Iron faucet pipes of three inches interior diameter were adopted. It was feared that larger ones would carry along too much air; and that the siphon would have to be fed too often at the summit, an apprehension which the results observed seem to justify.

A common faucet cock is placed at each end, to close the siphon when it becomes necessary to fill it again with water; and at the summit a large air vessel is provided to collect the air disengaged from the water, with a suitable opening at top, to let the air out and replace it with water; this opening being closed by a cap tightly screwed down. At the bottom of the air vessel there is, besides, a large cock, which is closed while the siphon is being fed through the top opening, so as not to interrupt the running of the siphon during the operation.

The annexed diagram represents the air vessel, *a*; *b* is the cap; *c* the cut-off cock; *e* the main pipe or siphon; *d* is a glass tube for observing the level of the water. This, however, being often broken was dispensed with at last; the level of the water being easily ascertained by knocking against the air vessel.



Things being now disposed as described, it might be supposed that the discharge would have gone on uninterruptedly, requiring only a careful attention to replenish occasionally with water the air vessel; but such was not the case; at first the joints had been made tight by packing with oakum and then thickly pitched over. The siphon was filled with water through the air vessel, which, being then closed and the ends open, the water began to flow; but this did not continue for more than five or ten minutes, when the air vessel was found empty of water, and had to be replenished at these short intervals; moreover, notwithstanding this tedious repetition of feeding the siphon, it would ultimately run dry in about two hours.

This was a truly discouraging circumstance; we ascribed it to the fact that, there being upwards of 200 joints, air was introduced in small bubbles through the oakum packing by the external pressure at every joint, and that it accumulated rapidly all along, especially in the longer arm of the siphon, which soon became too light. Accordingly, we decided not to abandon the enterprise, but to caulk the joints with lead in the usual way, which was not done before for motives of economy, and because, it being only a temporary fixture, it would have been more easily taken apart.

This operation was not entirely successful, though the caulking was made so hard that many of the bells broke in packing, without making the joints perfectly impermeable. Then a cement was made of equal parts of white lead and red lead mixed to the consistency of soft putty, with equal quantities of Japan varnish and boiled linseed oil. This cement carefully coated over the joints, made them at last perfectly tight. The siphon thus improved runs now regularly. Still the air vessel must be replenished with water every two hours, which is done by a pipe leading from a spring; and moreover, every six hours the ends must be closed, and the whole siphon filled in anew with water; otherwise it would run dry. It is probable that, owing to its being so long, and consequently so level, bubbles of air travel along very slowly and increase in size gradually; possibly some air may find its way under external pressure through the iron itself.

A curious circumstance took place in the beginning; the tunnel having progressed much beyond the well of the siphon, and the water considerably increased, a horse-power with chain pumps was constructed at the further end to pump up the water into troughs, by which it is led to the siphon well. Here, the siphon being insufficient for this accession of water, another horse-power was introduced to pump up water out of the same well. As soon, however, as the chain pumps began to revolve in the well, the siphon suddenly stopped and we were obliged to dig a separate well for it; since which time both have worked well.

The siphon, by actual measurement, when just replenished, discharges 43¼ gallons per minute, whereas all known formulæ give between 54 and 60 gallons, and furthermore, in Weale's "Engineers' and Contractors' Companion" occurs this conflicting remark taken from R. A. Peacocke's work:

"By Dr. Young's formula (considered by him the best), a 5-inch pipe would be used where a 3½ would suffice; a 7-inch where a 5 would suffice; a 10 inch where a 7 would suffice, and a 14-inch where a 10 would suffice."

And then he goes on to show the useless expenditure resulting from pipes too large being used in obedience to these formulæ. But here, in this extraordinary long siphon, his opinion is not sustained, and we find, on the contrary, the discharge is less than the formulæ given, and that neither they nor Mr. Peacocke's rules are applicable to this case.

The siphon I have described is, I believe, the longest ever attempted to be used, and on this account the results and anomalies it presents are somewhat interesting. It certainly has rendered considerable service in the Blue Ridge Tunnel; with no other current expense than the employment of a man to attend to the air vessel.—*By Col. Claudius Crozet, C. E., in the Journal of the Franklin Institute.*

A Chinaman on the Chinese Question.

Whatever may be the average intellect of the Chinese, there can be no doubt as to the intellect of the man who made the following speech. The remarks were delivered by Choy Chew, a Chinese merchant, at a recent banquet in Chicago:

"Eleven years ago I came from my home in China to seek my fortune in your great Republic. I landed on the golden shore of California, utterly ignorant of your language, unknown to any of your people, a stranger to your customs and laws, and in the minds of some an intruder—one of that race whose presence is deemed a positive injury to the public prosperity. But, gentlemen, I found both kindness and justice. I found that above the prejudice which had been formed against us, there flowed a deep, broad stream of popular equality; that the hand of friendship was extended to the people of every nation, and that even Chinamen must live, be happy, successful, and respected in 'free America.' I gathered knowledge in your public schools; I learned to speak as you do; to read and write as you do; to act and think as you do; and, gentlemen, I rejoice that it is so; that I have been able to cross this vast continent without the aid of an interpreter; that here in the heart of the United States I can speak to you in your own familiar speech, and tell you how much, how very much, I appreciate your hospitality; how grateful I feel for the privileges and advantages I have enjoyed in your glorious country; and how earnestly I hope that your example of enterprise, energy, vitality, and national generosity may be seen and understood, as I see and understand it, by our Government. Mr. Burlingame has done much to promote good feeling in China toward the American nation. He made himself well acquainted with the authorities at Pekin. He won their confidence to a remarkable degree. He is an excellent man, and, I believe, if his advice is received and acted upon, China will soon be the cordial friend of all the commercial powers of the earth. Already we are doing something in the way of progress in modern improvements. Steamboat lines have been established on our rivers, and the telegraph will soon connect us with the wonderful sovereignty of the Western hemisphere, where the people rule, where everything proclaims peace and good will to all. China must brush away the dust of her antiquity, and, looking across the Pacific, behold and profit by the new lessons of the New World.

"We trust our visit, gentlemen, may be productive of good results to all of us; that the two great countries, East and West, China and America, may be found forever together in friendship, and that a Chinaman in America, or an American in China, may find like protection and like consideration in their search for happiness and wealth."

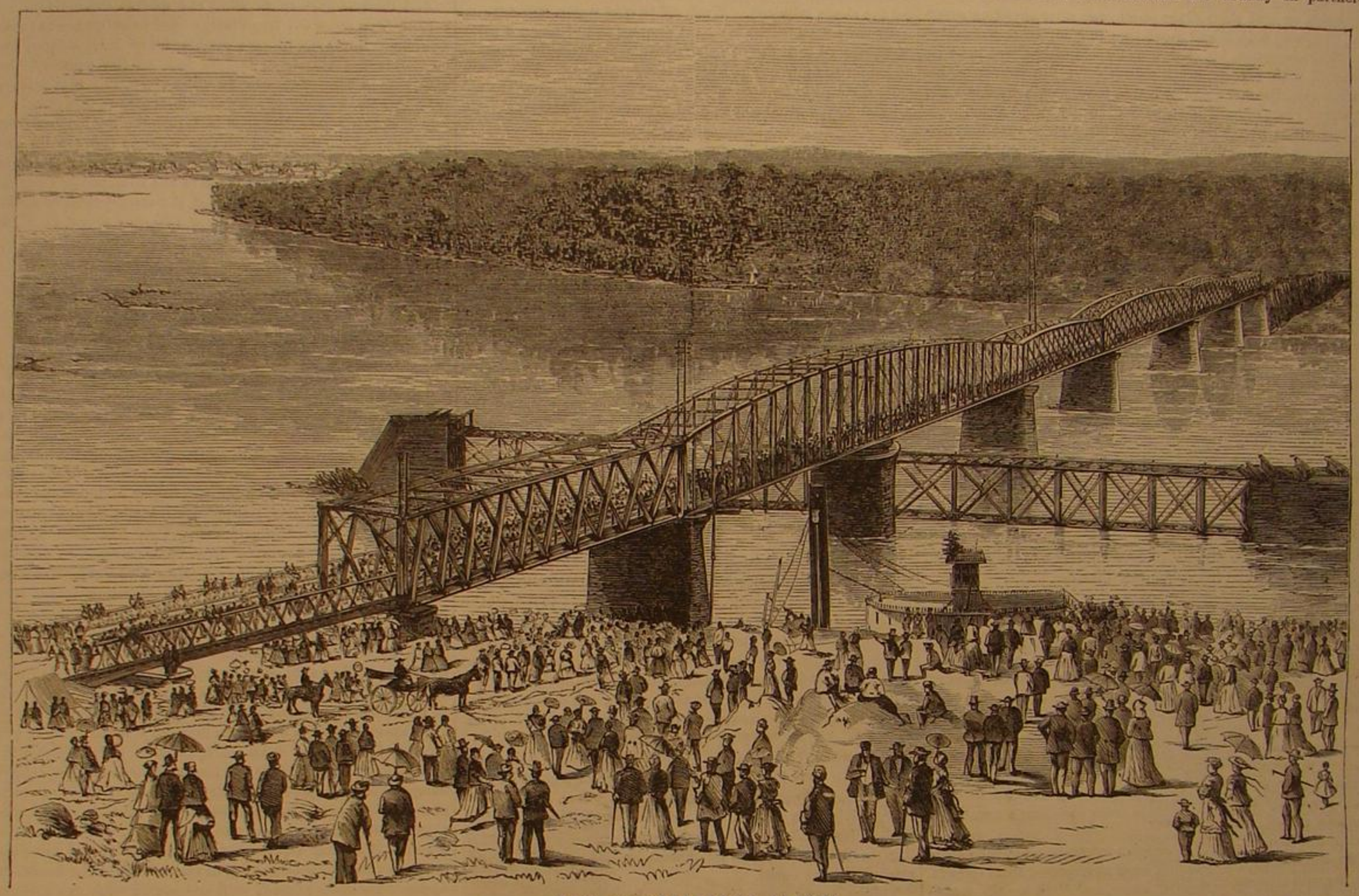
The Anthracite Coal Region.

Concerning the anthracite coal region, which has been so much talked of in connection with the miners' strike, we find an interesting sketch in the Baltimore *Sun*. Its area is four hundred square miles, and one hundred and seven miles of it lie within the limits of Luzerne county, Pennsylvania. The total quantity raised in the whole State of Pennsylvania down to 1860, amounted to a little over eighty-three millions of tuns, of which Luzerne furnished twenty-nine millions. The first company for mining coal was formed in 1792, and it was five years before they shipped to Philadelphia, and this venture consisted of thirty tuns. The city authorities consented to take it, and tried to burn it under the boilers of the engines at the water-works, but it put the fire out. The balance was broken up and used in place of gravel over the sidewalks, and only the blacksmiths near the mines used the coal for home use. The discovery was made by a tavernkeeper, Jesse Fell, of Wilkesbarre, who concluded that a good draft was alone necessary to make it burn, and he built a grate of green hickory saplings, placed it in a large fireplace in his barroom, filled it with broken coal and dry wood under the grate and set it on fire; the flames spreading through the coal, it was soon ignited, and before the wooden grate bars were consumed the success was proved, and hundreds of people flocked to the old tavern to witness the discovery.

SUSPENSION BRIDGE OVER THE MISSOURI RIVER.

Kansas City, Missouri, although not so well known in the East as Leavenworth, Omaha, St. Joseph, and possibly some other Missouri river towns—enjoys remarkable advantages of natural location and commercial facilities. It is already the terminus of seven different railroads.

To Kansas City belongs the honor of building the pioneer bridge over the Missouri. On the south or west side of the river the Pacific Railroad (of Missouri) extends from St. Louis to the State line at Kansas City; the Kansas Pacific Railway, late Union Pacific Eastern Division, is now in operation four hundred and five miles west from the same point of the boundary. The Missouri River Railroad, now operated in connection with the Missouri Pacific, continues that line up the river to Leavenworth; and the Missouri River, Fort Scott, and Gulf Railroad, running at present to Paola, forty miles south, is being pushed rapidly to the Indian Territory, and will become the great route from the North to the Southwest. On the opposite river bank the North Missouri Railroad forms a second line to St. Louis; the Missouri Valley Railroad runs northward to St. Joseph; and the Kansas City and Cameron Railroad, forming part of the Hannibal and St. Joseph Railroad line, opens a direct route to Chicago. The bridge, now completed, was built by the last-named road and will enable the seven roads to unite at common points within the city.



THE KANSAS CITY BRIDGE.

The location of the bridge, as shown in the accompanying topographical sketch, is opposite the town, and immediately below a bend in the river. It was begun in January, 1867. In February Mr. Chanute, the chief engineer, took charge of the works. In the spring the enterprise was interrupted by a high flood, and it was not until August that work could be resumed. The south abutment of the bridge was placed eighty feet back from the face of the bluff, and from it a sixty-six foot span extends over a street and the track of the Missouri Pacific Railroad to a pair of pillars standing near the edge of the rock face; a span of one hundred and thirty-three feet reaches from them to pier No. 1, the first river pier. A pivot-draw of two spans, each one hundred and sixty feet in the clear, and three hundred and sixty-three feet long over all, from center to center of piers Nos. 1 and 3, turns upon pier No. 2, which is placed as nearly as possible in the center of the channel. Pier No. 4 was located two hundred and fifty feet beyond No. 3; No. 5, two hundred feet further north, on the edge of the sand-bar; and two spans, two hundred, and one hundred and seventy-seven feet respectively, cover the distance remaining to pier No. 7, which stands on the edge of the wooded shore, taking the place of a north abutment. The railroad is then carried over the bottom land on two thousand three hundred and sixty feet of trestle-work, descending one foot in a hundred to an embankment. The carriage-way is carried down on a heavier grade by a side trestle.

The difficulties attending the building of this bridge were wholly in the foundations. The length of the structure is one mile.

The masonry of all the piers is of limestone, quarried in the neighborhood, the facing being of ashlar and the backing of heavy rubble. The ashlar of the upper courses, above the ice-breaker, is of a good blue-stone, of uniform color, and the stones used below are of a grayish tint. The piers finish eleven feet higher than the great flood of 1844, and forty-eight feet above the lowest water observed. The total hight of pier No. 4, from rock to coping, is eighty-nine feet. The pivot pier is circular in form and twenty-nine feet in diameter, finishing thirty-two feet on top.

The entire structure was completed by July 3, 1869, and the event was celebrated by the citizens of Kansas City with the greatest enthusiasm.

Bleaching Straw Hats.

Straw hats which have turned yellow may be bleached by the use of a soap prepared by taking any good soda soap and precipitating it from its solution by means of common salt, and adding to it one fourth the weight of sulphate of soda, previously rubbed into a mass with water, then drying the product. About equal parts, by weight, of water are to be poured upon this, and for every two pounds of soap, half an ounce of spirits of sal-ammoniac is to be added; and after the whole has assumed a gelatinous consistency, one part of the mass is to be dissolved in eight parts of warm water; smaller proportions of the foregoing will of course answer for a few articles. The objects to be bleached are to be washed by means of a brush in this solution, and transferred, while still moist, into water acidulated with hydrochloric acid (twenty-five parts water to one and a half of acid), and allowed to remain a few hours in this liquid. They are then to be washed with fresh cold water and dried. Experiment has proved the results of this method of bleaching to be exceedingly satisfactory.

Chinamen in California.

Hittell's "Resources of California," a notice of which will be found under the head of "New Publications," in another column, contains the following statements in regard to the Chinese in California, and their present condition:

"The Chinamen in California are nearly all very ignorant and very poor. Their number is about fifty thousand, of whom more than half have been six or seven years in the State. Most of them are engaged in mining; and the remainder are merchants, fishermen, washermen, and a few are employed as cooks in hotels, and as farm laborers on farms owned by white men. Most of them come from Southern China, and nearly all of them are members of five great companies, called the Yung-Wo, the Sze-yap, the Sam-yap, the Yan-wo, and Ning-yeung companies. These companies have each a large building in San Francisco, where they lodge and feed all the members of their company when they arrive from China, or when they come on a visit from the interior. The companies are benevolent associations, and take care of their indigent and sick. There are no Chinese beggars in the streets, and no Chinese patients in the public hospitals. The common laborers are brought to the State under contract to work for several years at a low rate of wages (from four to eight dollars) per month; and they usually keep these contracts faithfully. The employers in these cases are either the companies or associations of Chinese capitalists. The Chinamen generally are very industrious; indeed they are the most industrious class of our population, and also the most humble, quiet, and peaceful. The merchants are considered to be very faithful to their promises, and in San Francisco they can get credit among their acquaintances quite as readily as other men in similar branches of business. In the mines, the Chinamen work in the poorest class of diggings. They own no ditches, large flumes, hydraulic claims, or tunnel claims. The white miners have a violent antipathy to them, will not permit them to work in many districts, and will often drive them from their best claims in the districts where they are permitted to work. Sometimes the celestials venture to dam a stream, but not often. They use the rocker more than any other class of miners.

In San Francisco, the merchants are usually in partnerships, with not less than three nor more than ten partners; all of whom live in the store, and deal chiefly in Chinese silks, teas, rice, and dried fish. The two latter articles form a large portion of the food of the Chinamen in the State. They have not learned to use bread instead of rice. Those who can afford it, eat pork, chickens, and ducks. Beef, and most of our garden vegetables, do not find much favor with them, even among the wealthiest. The washermen are usually in companies of two or three, and they have numerous little shops in the streets of San Francisco, and in the smaller towns. They sprinkle their clothes previous to ironing, by filling the mouth with water and then blowing it over them. For ironing, instead of a flatiron, they use an iron pan with a smooth bottom, and kept full of burning charcoal. There are not more than one thousand Chinese women in the State, and nine tenths of these are prostitutes of the lowest class. The Chinese children are few.

The Chinese men, women, and children learn English very slowly; most of those who have been five or six years in the State cannot understand the most common English words. All the Chinamen in California adhere to their national costume, with some slight variations. They wear their hair long, use no white muslin or linen next the skin, and never put on a dress coat or stove-pipe hat. In the cities they ordinarily use wooden-soled shoes, with thin cotton uppers. Instead of a coat, they have a short blouse, generally of dark blue cotton, fitting close up to the neck. The wealthy have this blouse made of silk or fur. In cold weather, if of silk or cotton, it is wadded. The legs and lower part of the body are inclosed in breeches of cotton or silk, tight from the thigh down, and loose above. Some of the poorer men find trousers of the European pattern more convenient, and wear them. The miners generally wear coarse boots or shoes.

A Madras paper states that the wounded caudal appendage of a young lion was recently amputated at the stern while the beast was under the influence of chloroform. After the operation the surgeon commenced briskly rubbing, so as to inflate the lungs, a plentiful supply of water being also poured over the body, which soon restored the animal to life. This, we believe, is the first time that a lion has had his tail bobbed while under the influence of chloroform.

RESTORATION OF PERSONS APPARENTLY DEAD FROM DROWNING.

The following rules for the restoration of persons apparently dead from drowning, are those given by Professor Benjamin Howard, of this city, and sanctioned by the Metropolitan Board of Health of the city of New York. The accompanying engravings will also aid in their application.

Fig. 1 represents the mode of forcing and draining off water and other accumulations from the stomach, throat, and mouth, according to Rule 2, preparatory to performing artificial breathing.

Fig. 2 represents the posture of patient, A, according to Rule 3—arms extended backward, and ribs thrown prominently forward by a roll of clothing, *a*, beneath the back.

RULE 1.—Unless in danger of freezing, never move the patient from the spot where first rescued, nor allow bystanders to screen off the fresh air, but instantly wipe clean the mouth and nostrils, rip and remove all clothing to a little below the waist, rapidly rub and dry the exposed part, and give two quick, smarting slaps on the stomach with your open hand.

If this does not succeed immediately, proceed according to the following rules to perform artificial breathing:

RULE 2.—Turn the patient on his face, a large bundle of tightly-rolled clothing, *a*, Fig. 1, being placed beneath his stomach, and press heavily over it upon the spine for half a minute.

RULE 3.—Turn the patient quickly again on his back, Fig. 2; the roll of clothing being so placed beneath it as to make the short ribs bulge prominently forward, and raise them a little higher than the level of the mouth. Let some bystander hold the tip of the tongue out of one corner of the mouth with a dry handkerchief, and hold both hands of the patient together, the arms being stretched forcibly back above the head.

RULE 4.—Kneel astride the patient's hips, C, Fig. 2, and with your hands resting on his stomach, spread out your fingers so that you can grasp the waist about the short ribs. Now, throw all your weight steadily forward upon your hands, while you at the same time squeeze the ribs deeply, as if you wished to force everything in the chest upwards out of the mouth. Continue this while you can slowly count—one—two—three; then suddenly let go, with a final push, which springs you back to your first kneeling position. Remain erect upon your knees while you can count—one—two; then throw your weight forward again as before, repeating the entire motions—at first about four or five times a minute, increasing the rate gradually to about fifteen times a minute, and continuing with the same regularity of time and motion as is observed in the natural breathing which you are imitating.

RULE 5.—Continue this treatment, though apparently unsuccessful, for two hours, until the patient begins to breathe; and for a while after this help him by well-timed pressure to deepen his first gasps into full, deep breaths; while the friction of the limbs, which should, if possible, have been kept up during the entire process, is now further increased.

RULE 6.—AFTER TREATMENT—EXTERNALLY.—As soon as the breathing has become perfectly natural, strip the patient rapidly and completely. Enwrap him in blankets only. Put him in bed in a room comfortably warm, but with a free circulation of fresh air, and except for the administration of internal treatment, let him have perfect rest.

INTERNALLY.—Give a little hot brandy and water, or other stimulant at hand, every ten or fifteen minutes for the first hour, and as often thereafter as may seem expedient.

The philosophy of this treatment will be given in our next issue.

Electro-Heating Apparatus.

This invention, patented March 12, 1869, is based upon the well-known fact that electricity, in passing through a conductor of insufficient capacity (such, for instance, as a wire of very small diameter), evolves or develops heat. It is also well known that a wire of any great length, and of sufficiently small size to evolve considerable heat, will not conduct a strong current of electricity without difficulty and loss, and that as the wire becomes heated, its non-conductivity is increased, and that, in consequence, the heat becomes so great that the wire will be fused.

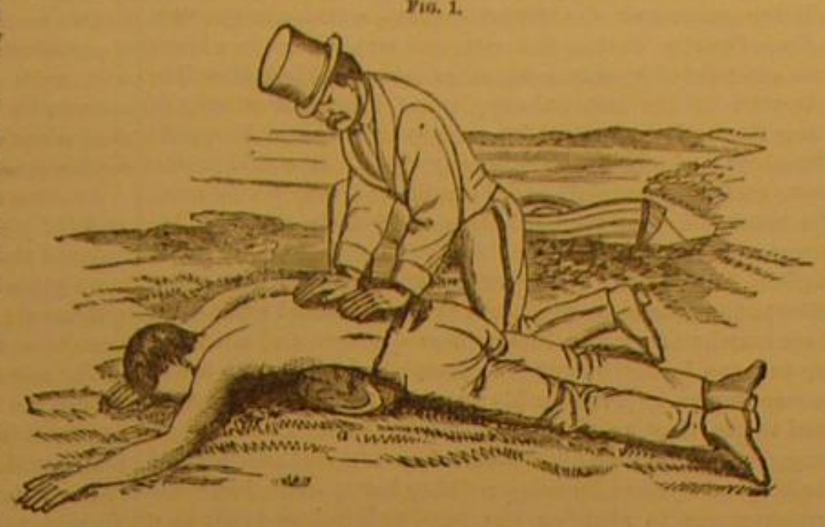
The object of the invention is to obviate this difficulty by enabling a strong current of electricity to pass through a heat-evolving apparatus of any length; and to this end it consists in providing an electrical conducting coil, or chain, with intervals of small conducting power, in traversing which the electricity will be caused to evolve heat; and further, in interposing between said obstructing intervals, free conductors of much larger size, which constitute reservoirs of electricity, and radiators of heat, and will effectually obviate the difficulty experienced in a continuous length of conductor of insufficient capacity.

In the engraving, Fig. 1 is a plan of a device, or apparatus, by which the invention may be applied for warming railway carriages, by means of heated metallic plates placed under the feet of passengers, portions of the plate being omitted, in order to expose the interior.

Fig. 2 is a plan, on a larger scale, of a portion of the conducting and heat-evolving coil or chain. Fig. 3 represents a vertical transverse section of the apparatus.

In this application of the invention, A, Fig. 1, may represent a bed or case of suitable non-conducting material. It is

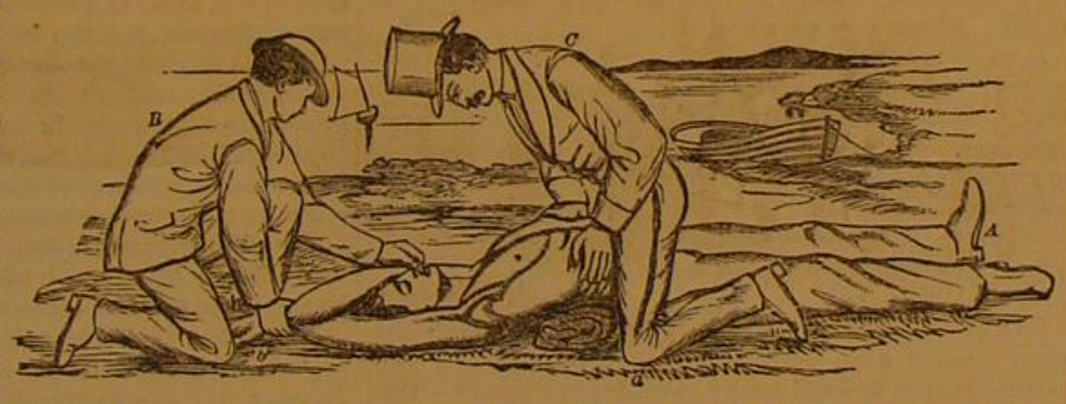
FIG. 1.



divided into parallel longitudinal grooves, of a sufficient size and depth to contain the coil or chain, and close enough together to allow of a compact arrangement of it. B represents the spaces, or divisions between the coil, and C, the coil, resting in the bed or groove. F G represent wires, to be connected with the poles of an electrical machine, battery, or generator, furnishing or producing a current of electricity best suited for the purpose of evolving heat; and H is a metallic plate, covering the coil, C, without contact therewith.

If the wires, F G, be placed in connection with any suitable electrical apparatus, the current of electricity, in passing the small intervals, D, Fig. 2, will evolve heat, but by reason of the shortness of these, and the reservoirs provided by the interposed metal, C, the coil or chain may be extended to any length, in order that a large and compact arrangement may be obtained to afford the required accumulation of heat. As

FIG. 2.



soon as the obstructions, D, become heated, the heat is rapidly communicated to the reservoirs and radiators, C, and from these to the metallic plate, H. It is intended to use the invention for producing heat in all cases where it can be applied to advantage, and to use the kind of electricity and electrical apparatus that may be found best adapted for the purpose.

In this application of the invention, namely, for railway carriages or cars, it is proposed to employ magneto-electric machines, constructed especially for this purpose, for producing the requisite current, placed, if necessary, under the car, and to obtain the power to operate them from the axle of the car—thus taking advantage of a motive power which already exists, but of which, heretofore, no use has been made.

Fig. 1

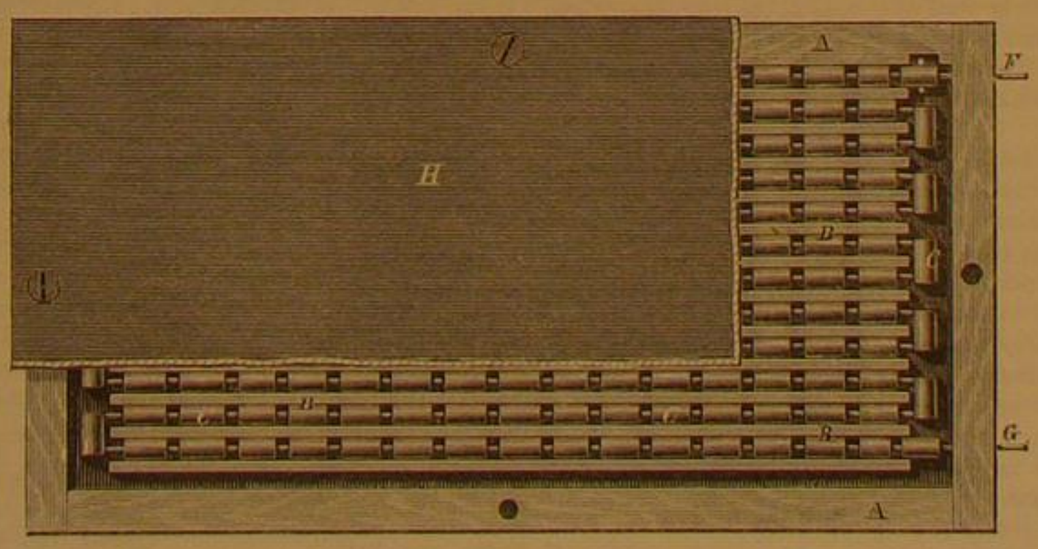
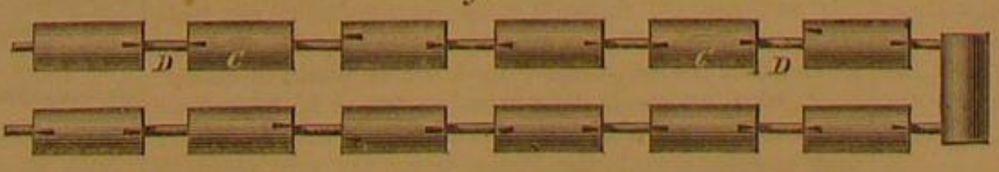


Fig. 2



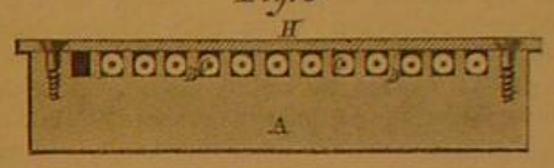
BURTON'S ELECTRO-HEATING APPARATUS.

A machine capable of heating to incandescence one foot of platinum wire one tenth of an inch diameter, will heat one hundred feet one hundredth of an inch; two hundred feet, two hundredths of an inch, etc.; the law being that the lengths of the wires vary inversely in proportion to the squares of their diameters. Now to reduce this to practice, it will be seen that a machine or battery of the power above referred to will heat a length of coil or chain, in which the aggregate length of the small wire of one-hundredth of an inch diameter, forming the obstructions, is one hundred feet; and two hundred feet, if their diameters are reduced one half, etc. In other words, having a machine of a certain power and a certain degree of heat is required, the diameters of the obstructing media may be reduced or increased in order to accommodate them to the power of the machine.

In order to warm an American car upon this plan, allowing for a tray placed in the floor of the car, in front of each seat, it is estimated it would require an entire length of the chain or coil of about three hundred and sixty feet, and in which the obstructing media form an aggregate length of about seventy feet; so that to accomplish this it would require a machine to heat this latter number of feet of small wire.

Although this may be a new application of electricity, and no machines can now be obtained already organized, and of sufficient power to be applied for this purpose, English electricians have made estimates of machines which come within all the requirements, as to power, space occupied, weight, power to operate them, etc., to make the invention practical and economical. Even with machines constructed for light-house purposes, eighteen feet of number twenty iron wire can be melted instantly; and the fact is well known to electricians, if the same machine were organized for producing a current of *quantity*, the heating power would be greatly increased.

Fig. 3



The inventor is not aware of any chemical battery by means of which this invention may be economically applied. In this case, the law of equivalents is in the way; and there must be a destruction of the battery corresponding to the amount of heat produced. In the course of time, however, chemical batteries may be constructed so as to be applied advantageously, as for instance those having large metallic surfaces exposed to a weak chemical action; or earth currents may be accumulated and utilized for this purpose; but for the present he relies entirely upon the magneto-electric machine. Advantage may be taken of a train of cars going down grade, when usually the steam is cut off and the brakes put down, without taxing the locomotive at all; whereas, in case of combustion of coal, the loss is the same whether going up or down grade. Among some of the advantages claimed for this method of heating railroad cars are the following:

First, its economy; second, its safety; and, third, its comfort. Concerning its economy, the trays may be constructed of hard wood, and covered by any metal, but copper would be best on account of its absorbing heat more rapidly and retaining it longer. As regards the cost of magnet machines, this would be materially reduced if they were made by machinery and in large numbers, instead of by hand. There would be but little wear and tear of them except at certain points; and in case the magnets should in time become weakened, they could be easily taken apart and re-charged. There being no strain or wear and tear upon the coil, being protected from injury by the plate covering it, and, besides, there being no possibility of its becoming oxidized by the degree of heat it would be subjected to—say 120 or 140 degrees, it is supposed it would last for an indefinite period. It is to be borne in mind, also, that by dispensing with stoves, eight seats in each car are gained, and, consequently, a train of seven cars would accommodate the same number of passengers, which, with stoves, would require eight cars. In short, the percentage upon the original outlay, would not compare to the annual expense of warming cars upon the plans now in use.

Regarding its safety, in case of a train being thrown from the track, instead of passengers being roasted alive by red-hot stoves, or scalded by the severance of steam pipes, the stoppage of the car stops the electric current; but even if it did not, there could be no possibility of a casualty from the effects of heat. What is claimed here as an advantage might be seized upon as a very glaring fault, and the question might be put: "But how do you propose to warm the car *before starting*, or in case a train should run into a snow bank?" The answer is, that by means of a wheel or pulley, connected by a band or cord with the machine under the car, the necessary current may be obtained by hand power to warm the car. "This might answer," the questioner is supposed to continue, doubtingly, "but how would you manage, say, with your invention applied to the cars of the Union Pacific Railroad?

You must know that, in ascending the Rocky Mountains, not only is the locomotive taxed to a much greater extent than upon the level ground of the prairies; but the

higher the train ascends the more rarefied, and, consequently, colder becomes the atmosphere." This is answered by stating that, in order to ascend the grades of the Rocky Mountains, locomotives of much greater power, and sometimes several, are employed; and the necessary revolutions of the machine may be kept up by an arrangement of pulleys similar to that employed in all machine shops, by which the speed of a lathe may be controlled by slipping the band upon a pulley of large or small diameter.

There can be no question as to the comfort of warming cars by electricity. There would be no exhalation of noxious gases nor deterioration of the atmosphere, as is the case with stoves. The heat radiated from, say, thirty metallic plates in the floor of the car would be not only sufficient to keep the feet of passengers comfortably warm; but by heating the lowest strata of air, would produce a genial warmth in the body of the car.

Much more might be said of this invention for utilizing the heat of the electric current. Much more might be said of its application in cases where a cheap power may be obtained; but it is presumed enough has already been said in order that the public may form an intelligent idea of the principles upon which it is based and of what is claimed as some of its advantages. Address for further particulars Dr. W. Leigh Burton, Franklin and Seventh streets, Richmond, Va.

Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

Crumbling of Pistons and Packing Rings.

Messrs. Editors:—Can you give me any scientific reason or explanation why the packing-rings or piston head should, while in operation, crumble and fall to pieces like plumbago? In two instances it has happened in my experience; first on a 12 by 30-inch engine, with 120 lbs. steam, making 60 revolutions per minute, apparently working well, perfectly smooth, and without jar. When main belt and steam were off, I could turn the engine by its 10-ft. fly pulley with ease, proving that it was not too tightly packed. After the accident the cylinder was perfectly smooth, and not in the least cut. The piston head was completely annihilated with the exception of the hub, which remained keyed to the rod. There was not a piece which weighed more than a pound, and those were few. The others were about the size of buckshot, or smaller, resembling plumbago. The oil used was machine oil, made in a candle factory.

Accident No. 2. Engine, 12 by 36 inch; steam, 50 lbs., 50 revolutions per minute; engine running beautifully, and had been for three months without removing cylinder head, when, hearing some disagreeable noise inside, I immediately shut down and removed the back head. To my surprise I discovered that the engine had turned into a shot factory, about two thirds of the outside rings had crumbled entirely to pieces about the size of buck shot, the remaining third being smooth on the under side of the piston. The oil used in the cylinder was crude olive oil of the country. In this case the follower and the remainder of the head remained intact. Both engines were horizontal.

The first accident occurred in San Francisco, Cal., in 1853. The second near this place (Saltillo) in 1866. Of the legion of inquiries I have made not one person have I found who could give me any satisfaction concerning the cause, or who ever heard or witnessed a similar accident; still I cannot believe that I am the first to whom this phenomenon has presented itself, as I firmly believe that there is no effect without a cause, and that certain causes produce similar effects. There must certainly be a reason which can be given, either chemically or mechanically, or both combined; but I must confess that my limited knowledge is not sufficient to solve the problem.

Steam has been used to propel pistons in cylinders for a sufficient length of time to have shown all its different results as regards temperature connected with the different lubricators, but in the above cases the lubricators as well as temperatures differ widely, and still produce similar results, which seems to clearly prove that neither the one nor the other is the immediate cause. George S. Pierce.

Saltillo, Mexico.

[Our correspondent is mistaken in supposing neither temperatures or lubricators have anything to do with the phenomenon described. Such accidents do not frequently occur, but have been observed and accounted for. The change in the piston head and packing rings is a chemical one; the iron combining with carbon liberated from the lubricators. It is perhaps not generally known that oils or tallow may be decomposed in steam cylinders at high temperatures, their carbon uniting with the iron to form a substance resembling plumbago or the substance formed from cast iron when long exposed to sea water. This is more apt to occur in jacketed cylinders where an excess of oil is employed.—Eds.

Purifying Drinking Water.

Messrs. Editors:—Perchloride of iron, no doubt, will answer very well for the purification of muddy water of streams like the Maas in the Netherlands, or the Mississippi and Rio Colorado on this continent, and where there is time for the muddy deposit to settle. The action is similar to alum for the precipitation of clay in water.

But for wells, cisterns, reservoirs, private or public, for water on shipboard, from springs or tanks—in all of which more or less organic substance is taken from the soil or deposited by the atmosphere, to breed diseases among those who have to use it—the simple method of forcing air through it purifies it perfectly, even when very foul before. The nitrogenous parts are oxidized and precipitated. A perforated pipe in the receptacle, not so near the bottom as to stir up the muddy deposit, and connected with an air pump above, by which air is impelled through the water a few times during the day, will make and keep the water perfectly sweet and wholesome.

As stated in your issue of August 7th, under the head of "Bread Baking," the patentee gives it free for family use, or for private cisterns, wells, or tanks.

R. d'Heureuse.

Lockjaw Cured by Tobacco.

Messrs. Editors:—Reading in the late papers the account of the recent melancholy death of the Engineer Roebling from tetanus, or lockjaw, reminded me of an incident in the military campaigns of a friend of mine, a Major in the 10th Indiana Cavalry during the war, and which he only a short time ago related to me among other events of his soldier life.

In view of the late unhappy event, I deem it worthy of being generally known, as his remedy is very simple, quick, efficacious, and obtained almost anywhere. It would in the above case have certainly saved the life of a very useful man. His command was then—Christmas 1864—in middle Tennessee near the Alabama line. One of his men was wounded slightly in the foot, hardly serious enough to go back a few miles to the nearest hospital, and as the command was, after a short march or so, going into winter quarters, and not wishing to leave it, he concluded to press on with it. The consequence was he took cold in his wounded foot, and tetanus ensued before they reached their winter quarters. All their surgeons and assistants had been left at various hospitals, and the hospital steward knowing nothing better to do, had made arrangements to abandon the man, as hopeless, to die at a plantation. The major casually learned his condition, and as it was a case of life or death anyhow (or rather certain death), he resolved to try an experiment and save him if possible. The man had the lockjaw more than forty hours, they had no medicines along (useless if they had) and the major's only resource was a plug of navy tobacco. He cut off a square of it (about three inches square), put it in a mess pan with boiling water until it was hot through, and saturated with the water; taking it out he allowed it to cool so as not to blister, then flattening it out, he placed it on the pit of the man's stomach. In about five minutes the patient turned white around the lips, which also began to twitch—the man was getting very sick—and in nine or ten minutes the rigid muscles relaxed and his jaws fell open. Indeed, it seemed as if the patient would fall all apart and go to pieces, so utterly was his entire muscular system relaxed. The tobacco was immediately removed and some whisky gruel given to stimulate him. Next day the man was taken along in ambulance, and in a few days mounted his horse all right, as bold a "soger boy" as as any. So much for a dead man.

It seems necessary in this disease to produce nausea, or sickness of the stomach, to cause the rigid muscles to relax. It is very difficult or almost impossible to administer internal medicines, and some external application becomes necessary to produce nausea, and this is furnished by the tobacco. The major found afterwards that damp tobacco applied to any part of the body would produce sickness, but much more quickly of course when applied to the stomach.

Mount Vernon, Ind. Aaron Baker.

[We give the above for what it is worth. The remedy proposed is one of great power, and would need to be used with extreme caution to avoid fatally nicotizing the patient.—Eds.

Argentine Republic Exposition.

Messrs. Editors:—The Exposition National, in Cordova (Argentine Republic), is to take place in the early part of next year.

It may be interesting to American manufacturers to learn that agricultural implements will be admitted free of duty, and that articles intended for this exposition will be conveyed to Cordova from Buenos Ayres at the expense of the State.

Information will be furnished to those interested on application to Edw. F. Dawson, Consul Genl.

128 Pearl street, New York city.

Car Improvements.

Messrs. Editors:—For a freight car or way passenger car, I would have an iron box fastened up under the car over the truck, having drip pipes. The box will contain water and the drip to be supplied by a set faucet. It will act the same as in a rolling mill.

For the through passenger cars, from New York to San Francisco, I would have four extra sets of trucks—one set at Chicago, another at Echo, another near Cisco, and the fourth at the end of the line. The cars to be raised by machinery, and the fresh trucks placed under. No delay need arise from the change. It will give satisfaction to the public and enable the train men to perfect their time.

H. N. Armstrong.

Stillwater, Minn.

A Machine Swindler.

If swindlers still thrive, it is also certain that all the fools are not yet dead. We are convinced of this by the receipt of a letter from the proprietor of the Machine Works at Exeter, N. H., who informs us that there is a firm at St. John, New Brunswick, that carries on the business of ordering machinery from manufacturers in the States, under the very plausible pretext that it is simply for the purpose of opening up a larger trade. The proprietor of the Exeter Machine Company was not exactly satisfied to ship his machinery to a strange firm without knowing something more about it, therefore he dispatched an agent to St. John, who there learned that the senior of the firm was a noted rascal, and that he was in constant receipt of machinery which he sold as quickly as possible, and pocketed the money and cheated the shipper. It does not seem to us possible that any of our manufacturers could be induced to ship machinery to a firm about which they know nothing—but so it appears.

Extinction of Fires in Manufactories.

The *Bulletin of the National Association of Wool Manufacturers* for July, contains the following account of the use of sprinklers for the extinction of fires in cotton and woolen mills:

Sprinklers, within a few years, have been extensively introduced into the Lowell mills, and in connection with the system of reservoir and mains, are considered the most effective means known for extinguishing fire. In some of the departments of a cotton mill, fire spreads over a whole room with such rapidity that hydrants, or other ordinary means, seem to be wholly inadequate to extinguish it. In such a case, a suitable sprinkler appears to afford the greatest protection practicable.

As constructed at Lowell, a sprinkler consists of a network of pipes perforated with small holes, so arranged and directed that when a valve connecting the sprinkler with the main pipes is opened, the water will flow into all parts of the system of pipes, and escape at the perforations with sufficient force to wet thoroughly and in a very short time every part of the room it is designed to protect. The idea is not new or peculiar to Lowell, but perhaps it has been more extensively and systematically adopted there than elsewhere. It was first introduced at Lowell, in the year 1845, into the picking room of the Suffolk Manufacturing Company, by Mr. John Wright, the agent of that company.

As is well known, this department of a cotton mill is peculiarly liable to fire from the action of the machinery on the cotton, and particularly on the foreign substances which are often found mixed with it.

After the construction of the reservoir, the advantages of the sprinklers, when used in connection with it, were so obvious, that they were soon introduced into the picking departments of all the cotton mills in Lowell. In 1852 and 1853, sprinklers were put into the roofs of the mills. In one of the old mills, which have slated roofs, the plan adopted was to carry a six-inch pipe from the main in the mill yard up near the middle of the mill to the level of the perforated pipe, which was placed a few feet below the ridge-pole, and extended the whole length of the mill in a single line, gradually diminishing in size from five inches in diameter near the middle, to three inches at the ends. This pipe was perforated with two holes three-sixteenths of an inch in diameter, in each foot in length. These holes point in different directions, so as to wet, as far as practicable, all parts of the roof. The water, after striking the roof, falls; and a large portion of it finds its way into the stories below. The valve connecting the sprinkler with the main pipe is placed in or near the ground, usually in a pit in the ground, near the mill so as to be always readily accessible, and, the water being constantly maintained in the main pipe at a high pressure, the sprinkler can be put in operation with very little delay.

The roof sprinkler is deemed a very great security against heavy losses by fire, as it affords the means of applying a large volume of water at the top of the mill, where, from the elevation, it would otherwise be difficult to apply it. This apparatus is expected to discharge about four hundred gallons of water per minute, and is intended to be used only for a few minutes at a time, unless the fire is confined to the roof. Its efficient action requires that most of the hydrants should be shut off.

Between the years 1853 and 1859, sprinklers had been introduced into many of the carding and spinning rooms of the cotton mills, which rooms are particularly liable to the rapid spread of fire. In the year 1859, sprinklers were required to be put into all such rooms, as well as into all picking rooms, and all other buildings and rooms liable to the rapid spread of fire or of difficult access.

It has been found by experiment that about four hundred and fifty gallons per minute is the largest quantity of water which can be drawn from the main pipes in some of the mill yards, from the reservoir alone, and maintain an effective working pressure. If a large fire should occur at a time when the canals are drawn off, as they often are during the night and on holidays to enable repairs to be made, the force-pumps could not be operated, and the supply of water would be limited to that which could be drawn from the reservoir. By operating one section at a time, the sprinklers can be effectively used in such an event; but in a large fire, the supply of water would be much too small for the efficient action of all the apparatus provided. The remedy is a larger main pipe, an improvement we are looking forward to, in order to perfect the system.

There is said to be a grape vine near Santa Barbara, California, the trunk of which measures thirteen inches in diameter, the branches covering an area of sixty-five feet in diameter. It is trained upon a trellis-work supported by sixty-four posts. It is stated that the vine last season yielded six tuns of grapes, which brought $260. The vine is twenty-four years old. Another vine, trellised in the same way, eleven years old, bids fair to outstrip the old one. It now covers an area of thirty-six feet in diameter.

An exchange states that a new description of lava is being thrown from the crater of Vesuvius since the last eruption, consisting of a beautiful mass of crystallized salt. This beautiful phenomenon has hitherto been unknown in volcanic natural history. The scientific bodies are occupied in investigating the cause and composition of the crystals. None of the *savans* feel inclined to go down and see into it as yet.

PREMATURE BURIAL---ITS PROBABILITIES.

A writer in *All the Year Round* gives a collection of instances where premature burial had *very nearly* taken place, and also instances of resuscitation where death had been previously supposed to have taken place, and argues therefrom the great probability that such interments are more frequent than is generally supposed.

Most of the facts are extracted from a debate upon a petition presented to the French legislature in 1866, and in which Cardinal Donnet, Archbishop of Bordeaux, took a leading part. The Cardinal stated no less than three instances which had occurred in his experience, where people were at the last moment rescued from being buried before death, although the appearances seemed to warrant the conclusion that they were dead. The petition alluded to set forth the danger of hasty interments, and suggested the measures thought requisite to avoid terrible consequences. Amongst other things, it was asked that the space of twenty-four hours between the decease and the interment, now prescribed by the law should be extended to eight-and-forty hours.

The article from which we have quoted gives some remarkable cases of suspension of life in cases of drowning, which ought to be generally known, as showing that efforts to restore vital action ought not to be too hastily given over.

"On the 13th of July, 1829, about two o'clock in the afternoon, near the Pont des Arts, Paris, a body, which appeared lifeless, was taken out of the river. It was that of a young man, twenty years of age, dark complexioned, and strongly built. The corpse was discolored and cold; the face and lips were swollen and tinged with blue; a thick and yellowish froth exuded from the mouth; the eyes were open, fixed, and motionless; the limbs limp and drooping. *No pulsation of the heart or trace of respiration was perceptible.* The body had remained under water for a considerable time; the search after it, made in Dr. Bourgeois' presence, lasted fully twenty minutes. That gentleman did not hesitate to incur the derision of the lookers-on, by proceeding to attempt the resurrection of what in their eyes was a mere lump of clay. Nevertheless, several hours afterwards, the supposed corpse was restored to life, thanks to the obstinate perseverance of the doctor, who, although strong and enjoying robust health, was several times on the point of losing courage, and abandoning the patient in despair."

It is also shown that in suffocation by foul air and mephitic gas, suspended animation may be mistaken for real death, and a case is stated where a person thus suffocated with charcoal fumes and apparently dead, was restored to life only after *eleven hours'* unremitting exertions.

A singular fact is mentioned in regard to persons who have died of cholera:

"While M. Trachez (who had been sent to Poland to study the cholera) was opening a subject in the dead-house of the Bagatelle Hospital in Warsaw, he saw another body (that of a woman of fifty, who had died in two days, having her eyes still bright, her joints supple, but the whole surface extremely cold), which visibly moved its left foot ten or twelve times in the course of an hour. Afterwards the right foot participated in the same movement, but very feebly. M. Trachez sent for Mr. Searle, an English surgeon, to direct his attention to the phenomenon. Mr. Searle *had often remarked it.* The woman, nevertheless, was left in the dissecting-room, and thence taken to the cemetery. Several other medical men stated that they had made similar observations. From which M. Trachez draws the inference: 'It is allowable to think that many cholera patients have been buried alive."

Exposure to cold is stated to be another cause of the suspension of vitality liable to be mistaken for actual death.

"M. de Parville now professes to place in any one's hands a self-acting apparatus, which would declare, not only whether the death be real, but *would leave in the hands of the experimenter a written proof of the reality of the death.* The scheme is this: It is well known that atrophine—the active principle of belladonna—possesses the property of considerably dilating the pupil of the eye. Oculists constantly make use of it, when they want to perform an operation, or to examine the interior of the eye. Now, M. le Docteur Bouchut has shown that atrophine has no action on the pupil when death is real. In a state of lethargy, the pupil, under the influence of a few drops of atrophine, dilates in the course of a few minutes; the dilation also takes place a few instants after death; but it ceases absolutely in a quarter of an hour, or half an hour at the very longest: consequently, the enlargement of the pupil is a certain sign that death is only apparent.

"This premised, imagine a little camera-obscura, scarcely so big as an opera-glass, containing a slip of photograpic paper, which is kept unrolling for five-and-twenty or thirty minutes by means of clock-work. This apparatus, placed a short distance in front of a dead person's eye, will depict on the paper the pupil of the eye, which will have been previously moistened with a few drops of atrophine. It is evident that, as the paper slides before the eye of the corpse, if the pupil dilate, its photograpic image will be dilated; if on the contrary, it remains unchanged, the image will retain its original size. An inspection of the paper then enables the experimenter to read upon it whether the death is real or apparent only. This sort of declaration can be handed to the civil officer, who will give a permit to bury, in return."

It may be that in France, where people are required to bury their dead so early after decease, the danger of premature burial is not exaggerated; but in this country where, under ordinary circumstances, the bodies of the dead are kept until decomposition sets in, we do not believe the danger of burying alive is one in twenty millions. A good deal of excitement has been created in the public mind by recent sensation articles in the daily papers, exaggerating the risk of premature burial, and painting in high colors the value of an apparatus whereby a person so interred and returning to consciousness might by his own efforts extricate himself. We would be willing, however, to wager that however efficacious such an apparatus might be, it would not, in this country, be practically tested once in half a century.

Electricity Applied to Manufacturing Textile Fabrics.

ELECTRIC ENGRAVING MACHINE.

A machine for engraving the cylinders of copper or brass employed in printing woven fabrics and paper hangings, is an invention of French origin. The voltaic current is used to determine, by means of electro-magnets, the slight simultaneous advance or withdrawal of any number of engraving diamond points from the varnished surface of the copper rollers to be engraved, according to the position of a corresponding metal contact point on the non-conducting surface of a prepared pattern. The pattern and cylinder to be engraved are moved mechanically in concert, and the proportion of their relative movements can be varied by mechanical adjustment. The engraving points have a slight vibrating motion given to them, which scratches off the varnish whenever brought into contact with it, and produces a series of fine zigzag lines, which facilitate the retention of the pasty coloring matter used. The prepared pattern determines the moments at which this contact occurs; and the concert between the movements of the pattern and the roller produces a similar agreement between the pattern and the figures engraved, which may clearly be made larger or smaller than the pattern in any desired proportion and in any required number. The copper when exposed is afterwards etched by an acid bath.

ELECTRIC LOOM.

This extremely ingenious contrivance, in which the usual Jacquard cards are replaced by an electrical arrangement, worked by a pattern prepared in tinfoil with insulating varnish, is the invention of Cav. G. Bonelli, Turin.

A simple metal plate, perforated with holes, each of which is provided with a kind of piston, successively plays the part of each successive paper card in the usual arrangement. The pistons fill up every hole that is not required, but are withdrawn by electro-motors from those holes which require at each beat of the loom to be kept open. This is effected as follows:

A sort of metal comb, each tooth of which is the terminal of a separate insulated conducting wire, rests on the prepared pattern. Whenever a tooth touches the tinfoil, a circuit is completed through its conducting wire; but where a tooth rests on the varnish, the circuit is broken. Each conducting wire includes in its circuit an electro-magnet. The pistons already spoken of are each composed of a small soft-iron shank, and brass button-shaped head, and are all held horizontally in a frame, one opposite each electro-magnet. In one position of this frame, the heads of these pistons project through the openings of the metal card or perforated plate; the diameter of each pole is a little larger than the head of the corresponding piston, each piston being exactly in the center of its corresponding pole. In this same position all the soft-iron shanks touch the poles of the corresponding magnets, and the metal comb rests on the prepared pattern.

A certain number of the electro-magnets corresponding to the uncovered portions of the tinfoil, are therefore active or attract the shanks, but the others exert no attraction. The frame with the pistons is now pulled forward away from the magnets; those pistons which are opposite the active magnets are held back, sliding in their frame, so that their button-heads pass behind the perforated plate; but the other pistons come forward with the frame leaving the magnets. The perforated plate then drops a little way, and by this simple contrivance all those piston-heads that were in front of the plate are retained there, whatever pressure comes against them, for they are now eccentric from the poles. The plate in this condition presents a perfect analogy with the common prepared card. A certain number of holes corresponding to the metallic part of the pattern are vacant, the rest of the holes are blocked up, and present an unbroken surface by which the proper hooks of the Jacquard loom are acted on during one stroke. The perforated plate is then brought back to the position first described, the prepared pattern is moved on a little step, and the same process repeated.

When shuttles with several different colors are to be used, the pattern is subdivided into insulated portions corresponding to the separate colors by removing a very thin outline of foil round each; all the parts correspouding to one color are afterwards connected.

As each shuttle is thrown, the battery is brought in contact with the appropriate series of insulated patches of tinfoil, producing a succession of different cards, and the pattern is not shifted forward until all the colors are exhausted. After the completion of each fresh combination on the perforated plate, the battery circuit is broken by a proper contact-breaker, and the injurious spark is thus avoided, which would otherwise occur when the comb is lifted from the pattern prior to a shift.—*The Student's Text-Book of Electricity.*

Durability of Portland Cement.

It is somewhat difficult to ascertain the durability of modern substances, as manufacturers occupy themselves principally in producing cheaply, and pay little attention to experiments on durability. We know very well that a modern coat does not last so long as if it were made of cloth as manufactured forty years ago, yet we prefer it by reason of its fineness of texture and the lowness of its price. We can ascertain the quality of a pane of glass in regard to its clearness, transparency, polish, etc., but we cannot tell how long it will last before getting dull or assuming iridescent colors.

It is not improbable that a good Portland cement may last for tens or even hundreds of years; but we cannot prove this, as our experience and observations only embrace a period of fifty years.

We do not know what other agents besides air and water may effect cement in the course of time, nor can we tell whether all cements are equally durable.

This last idea forcibly occurred to me ten years ago, when a cement produced by a German house was used successfully in laying pipes at a distillery. Another cement procured in the following year from the same manufactory and used in the same purpose fell to pieces in a few weeks.

This induced me to make experiments, which I do not consider conclusive, but which may serve to prevent similar occurrences, and may also give the manufacturer a hint how to conduct experiments in this respect.

These experiments served principally to determine the influence of warm and salt water, and of the air at different temperatures. In this manner I tried to concentrate the influence of time.

My experiments were comparative ones, as they served for practical purposes, in order to determine which kind of cement should be used for a certain purpose.

1. I immersed set pieces of cement in water containing 15 per cent of common salt, in which I kept them for weeks at a temperature of 30° Centigrade.

2. The same pieces were then dried in the sun and again immersed in the solution.

3. I also made experiments with cement in the winter of 1856-57, by exposing it in a wet state to the frost, and then immersing it in hot water, and *vice versa.*

Some German cements stood these superficial trials very well, others rather badly, and the English cement worst of all.—*Reid's Translation of Lipowitz' Treatise.*

Our Importations from France.

We gather from the report of Mr. Nicolay, dated April 29, 1869, that the importations of French goods during the period extending from July 1, 1863, to December 31, 1868, were as follows:

1863 (six months)	$ 54,283,403
1864	82,345,531
1865	139,141,569
1866	180,617,837
1867	149,994,256
1868	131,457,225
Total	737,839,821

These importations were chiefly articles of luxury. The New York *Times* in commenting upon this subject, remarks: "The articles of actual utility are fractional in value compared with those which enter exclusively into ladies' use. Thus, taking the year 1866 as a basis of illustration, the reported value of merinoes, bombazines and crape was not less than $39,222,500; silks absorbed $6,799,193; shawls, $3,832,505; kid gloves, $7,046,800; flowers and artificial feathers, $3,549,035; fancy goods, $8,605,037; buttons and trimmings, $8,701,273; laces, $2,478,620; jewelry and precious stones, $7,321,023; miscellaneous dry goods, $16,548,276. Here are ten articles which in one year represent, in the cost prices at Paris, an aggregate of $104,104,262; and this sum was at least doubled when the consumers paid their accounts. And in this recapitulation we take no notice of the Paris boots and shoes, the hair, and the minor *et cetera* of which the ladies are the sole buyers. Nor does any statement founded upon certified invoices indicate the full extent to which the Paris trade is indebted to American buyers. To render this view complete, we must add the sums expended by American visitors, who are supposed to make their purchases without the slightest reference to cost."

Refining Vegetable Oils.

Mr. C. Michaud, of Honfleur, has discovered a new method of refining oil which will probably eclipse all those in general use at the present day. This method has just been communicated by M. Chevallier to the Société d'Encouragement. While sulphuric acid is introduced into the oil in minute numerous streamlets, air is blown into the oil so as to produce a great commotion in the liquid and to fill it with air bubbles. The mucilage contained in the crude oil, being acted on by the acid, soon forms with the air a voluminous layer of scum at the surface, which is skimmed off as it forms. This insufflation of air is repeated several times in succession, and the scums cleared off every time until the oil is clarified. At this point of the operation it still retains free sulphuric acid. It is now run into a copper vessel, and steam is forced through it until the oil has reached a temperature of 100° C. The steam is then allowed to bubble through for half an hour or an hour longer. After the oil has cooled down some 20° or 30° C., which may be done artificially, it is run through an ordinary filter. Two large refineries have lately been put up on the "Michaud" plan, and the oil produced by them is so pure, that the wick of a lamp burning it will not carbonize after many days' usage.

A LARGE company of homeless boys and girls left the office of the Children's Aid Society, a few days since, in charge of one of the Western agents, to be provided with homes and employment in the States of Illinois and Wisconsin. The number of destitute and friendless children applying to this Society for aid during the past few weeks has been exceedingly large. The demand for clothing was considerably in excess of the supplies in their wardrobe. This Society is one of the best of all the charitable institutions of this city, and deserves a liberal support. Children exposed to all the vices of a great city are tenderly taken away to virtuous homes in the country. What can be more Christ-like than this?

Improvement in Front Gear for Wagons.

We not long ago expressed the belief entertained for some time by us, that there was yet room for considerable improvement in draft vehicles, and as if to corroborate our belief we now have before us a marked improvement in the front gear of wagons, comprising changes in the construction of the tongue, a new method of connecting the reach or coupling bar to the bolster, and important changes in the structure of the framework to which the tongue is connected.

By reference to the engravings the structure of the tongue will be easily understood. It is composed of two pieces of timber, say, for a two-horse wagon, one inch by two and three eighths, tapering toward the point in the usual proportion. The two parts are joined together at the front end, but separate back toward the bolster, and are laterally braced by metallic plates having studs at the ends which pass through the timber bars and are firmly riveted. The ends of the bars where they meet the hounds are plated with metal, but are not attached in the usual manner. Before we state the method of attaching the tongue we must, however, describe the modification made in the general framework attached to the axle and sand bar.

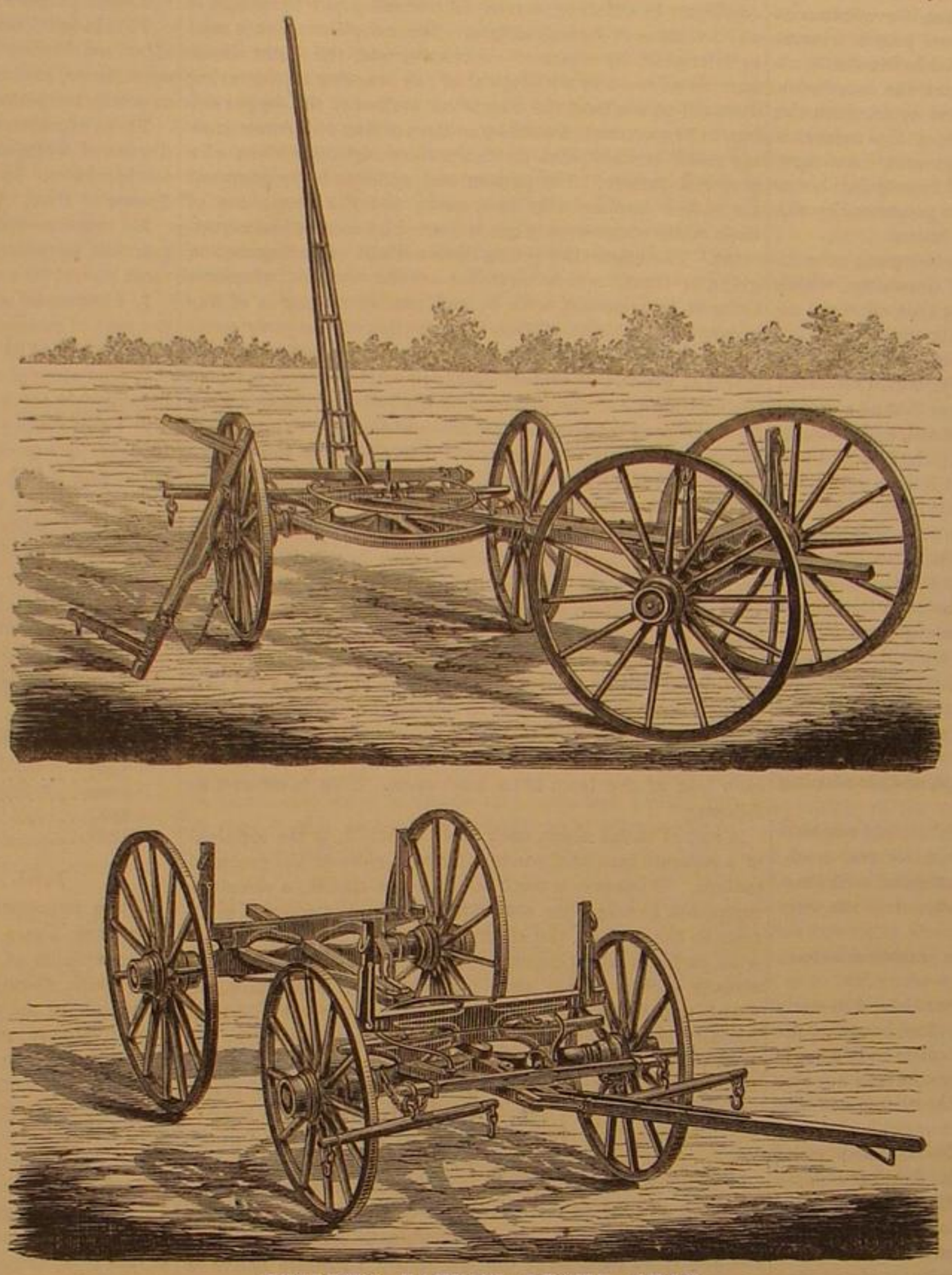
A straight bar of wood is placed between the hounds, running back through a recess in the top of the axle and bolted not only to it but to the center of the curved oscillating bar in the rear of the axle To the straight bar thus inserted, the reach or coupling bar is attached in the rear of the front axle, thus allowing more cramping of the forward wheels without jamming them into the wagon box. By this means, also, the draft is transferred to the reach without the intervention of the axle and the old-style king bolt, and all rocking motion of the axle is avoided. Instead of the king bolt running down through bolster, axletree, and reach, as commonly used, a fixed bolt rises from the axle upon which the bolster turns, tapering toward the top to allow some play.

The two parts of the tongue are connected to the hounds by a suitable bolt, both the hounds and the straight draft bar above described being recessed to admit the ends of the tongue bars.

The advantages secured by these changes are greater strength, grace, and lightness of parts, greater freedom in cramping, less wear in use, and consequent greater durability.

The inventor, a practical wagon builder, informs us that wagons built with this form of front gear, have so completely superseded the old style, in the section where he resides, that he is now building none but the new style.

Patented, July 27, 1869, through the Scientific American Patent Agency, by A. Finley, Bainbridge, Ind., who desires to dispose of his entire right.



FINLEY'S PATENT FRONT GEAR.

Nutmegs and Cloves

The nutmeg-tree throughout the Indian Archipelago becomes fruitful at the age of seven years, and increases its produce till the fifteenth year, when it reaches the hight of productiveness. It is said to continue prolific for a quarter of a century in the Moluccas. Seven months in general elapse from the appearance of the blossom and the ripening of the fruit. The average produce of a tree from its fifteenth year may be calculated at five pounds of nutmegs, and a pound and a quarter of mace. The great harvest is in the months of September, October, November, and December, and there is a small one in May and June. The fruit having ripened, the outer integument bursts spontaneously, and is gathered by means of a hook attached to a long stick, and the mace, having been cautiously stripped off and flattened by the hands in single layers, is placed on mats for three or four days in the sun to dry. In damp and rainy weather the mace is dried by the heat of a charcoal fire, so as not to smoke it or blacken its surface. The mace liberated from the macy envelope is transported to the drying-house, and deposited on an elevated stage, the heat of a smouldering fire beneath passing upwards with the smoke between the rafters. Dried up kernels, which figure as damaged at public sales, have undergone too high a degree of heat in this process. The fire lighted in the evening is extinguished in the morning, the process of smoking is repeated for two or three months, when the nuts will be found to rattle freely. They are now regarbled, and finally packed for transportation in tight casks, the insides of which have been smoked, cleaned, and covered with a fresh coating of water and lime. Cloves, which are planted in rich, red mold, yield generally at the end of six years, and reach the highest state of bearing at twelve years, when their average product is six to seven pounds of marketable fruit.' The fruit is terminal, and, when of a reddish hue, is plucked by the hand, so that the process of gathering it is tedious. It is then dried for several days on mats in the sun until it breaks easily between the fingers and assumes a dark brown color. It loses about 60 per cent in drying. When past its prime the clove tree has a ragged and uncombed appearance, and its existence is limited to twenty years, unless in very superior soil.—*Grocer.*

How an Elevator Operates.

When the boat containing the grain to be taken into store is moored alongside the pier, the "transferer" is swung out from the side of the elevator into the hold of the boat, and sinks into the loose cargo. This "transferer" is simply a series of metal scoops or buckets, fastened to a band inclosed in a siphon-shaped box, and when in operation these scoops run quickly through the grain, and carry it to an upper floor in the elevator, each one emptying itself as it runs over the crescent at the top of the siphon, and, going down the other leg of it, is ready for another plunge through the grain in the hold of the vessel. Arrived at the upper floor, the grain is first weighed, a large stationary hopper seated on a standing scale being provided, into which the buckets empty their contents; and when the "beam" of this scale goes up it indicates that the number of bushels at which the scale has been set is in the hopper, when, by pulling one slide and closing another, the contents of the hopper are let out and the entrance of any further grain prohibited until it all escapes. In measuring or weighing a cargo by this means, the rule is to allow to the bushel sixty pounds of wheat, fifty-six of corn, fifty-six of rye, thirty-two of oats, forty-eight of barley, and sixty of peas. When weighed the grain falls on a sifter underneath the hopper, which is continually jogging backward and forward, where, in passing through the perforations in the iron bottom, it is cleansed of dirt, husks, pieces of cob, or such foreign matter, larger than the kernel itself, as may have got into the grain. It is thence conveyed again to a story above that on which the hopper is situated, to a screen containing still smaller perforations than those in the sifter, where it undergoes a second cleansing process, and from this point to a "blower," through which a blast of air is continually passing, and by this means it is still further cleansed of the fine dust that has collected in it. After this it may be either run directly into the ship which is to take it to a foreign port, or put in store. If stored, it is transferred to its appointed bin, on any floor of the warehouse, by means of an auger-like apparatus inclosed in a square box-like arrangement running longitudinally over the roof of the warehouse. This is known as the "conveyer;" and from it, at oblique angles, there run square tubes, which, when opened, let down the grain to any floor where it is desirable to store it. These tubes extending vertically through the entire depth of the building, and over the bin on each floor thereof have slides, which, on being drawn, allow the grain to make its exit into that particular compartment. Sometimes, in consequence of the fact that the grain has become heated or sweaty, and is in danger of being totally spoiled, it is necessary to put it through the drying process. In such event it is run into a large cylinder, through which hot air is continually passed by means of tubular pipes, and conveyed thence gradually into a bin in the coolest part of the warehouse. When it arrives here it is invariably dry and hard, having occupied about twenty or twenty-five minutes in passing through the cylinder. Another operation is the "smutting" of the grain, or the taking from it the black fungus, which renders it diseased, and which, if allowed to remain in a cargo mixed with the sound grain, will in a short time spoil the whole of it.—*New York Times.*

Water and Health.

Let it be everywhere taught that water forms the largest component of the several textures and organs of both animals and vegetables; it being in the proportion of more than three fourths of the entire body, and four fifths of the nutrient fluid, blood, consisting of it. Of the predominance of the aqueous over the solid parts of the entire body, a striking proof is furnished in the case mentioned by Blumenbach, of the dry mummy of an adult Guanche, which, with all the viscera entire, did not weigh more than seven pounds and a half. How large and constant must be the supply of water, in the first place, to meet all the wants of assimilation and nutrition, from the incipient stage of digestion to the final deposit from the blood in the cells, for the growth and support of the several organs; and, in the second place, to compensate for the continued loss of this aqueous fluid from the kidneys, and in the secretions from the skin and the gastro-intestinal and pulmonary mucous surfaces. In order to make up for the consumption and discharge of water in these different processes of assimilation and of disassimilation or waste, the organism is supplied, first, by the fluid taken as drink; secondly, by that which is absorbed by the skin and lungs from the surrounding air; and, thirdly, by the water largely contained in the substances used for food. Even of the solid food which we eat, not less than four fifths of it consist of water; and we might go so far as to say that nine tenths of the whole of our food are little else than pure water. If lost in any great quantity from the body, there ensues an arrest of vital action, as may be easily seen in the lower animals. Liebig shows how water contributes to the greater part of the transformations that take place in the living organism.

Prout is decided in his appreciation of the dietetic value of water, and he ranks the aqueous, together with the saccharine, the oily, and albuminous, as the four great elementary, proximate, or primary staminal principles. We have well-authenticated cases of persons who have lived for a length of time while abstaining from all customary food, and whose only drink was water. Of this nature is the case of Reuben Kelsey, related by Dr. McNaughton, in the "Transactions of the Albany Institute," 1830. This man, aged 26 years, lived on water alone for fifty-three days. "For the first six weeks he walked out every day, and sometimes spent a greater part of the day in the woods. His walk was steady and firm, and his friends even remarked that his step has an unusual elasticity. He showed himself a week before his death, and was able to sit up in bed to the last day."

Kelsey starved himself to death, under a delusion that when it was the will of the Almighty that he should eat, he would be furnished with an appetite.

Among the greatest names in medicine are found the warmest eulogists of water, as the most salutary and sustaining drink in health, and among the foremost remedies in disease. It is to be deeply deplored that the profession at large is not thoroughly imbued with this truth, and does not feel it to be a paramount duty to urge on all persons its importance, and an adoption of the practice flowing from it, as conducive alike to man's physical and moral well-being and pleasure. There is abundant testimony, derived from the personal experience and extensive observations of eminent medical men, to show that the inconveniences and dangers from living in hot climates are infinitely less for water-drinkers than for those who use intoxicating liquors of any description. A similar kindly and preservative power is displayed in favor of those who are exposed to the extreme and continued cold of Arctic travel and navigation, and who, under circumstances, either from choice or necessity, have made water their sole drink, except when the occasional addition of tea or coffee was procured. This is the experience, also, of soldiers in the field, and expososed to hardships of all kinds, and of men who have to carry on laborious occupations in a high temperature, as in iron founderies, glass-houses, etc.—*By John Bell, M. D., in Druggists' Circular.*

A CORRESPONDENT proposes the introduction to the Southern States of the date palm, the sugar palm, and the cocoanut palm—those palms furnishing fruit, sugar, oil, fiber, etc. He argues in favor of trying at least the experiment of introducing these Indian palms; and he holds that, if properly planted and cared for, they will flourish and become profitable to the South.

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THE RELATION OF THE DIAMETERS OF GEARING TO FRICTION.

Given a mean effective pressure in a steam engine making its stroke in a given time, or a given weight of water constantly falling through a given number of feet in a given time, the mechanical power of each may be at once deduced; but this power is never wholly utilized in useful work. The resistances which absorb the power of motors may be placed in three categories; namely, the resistance of the medium in which the several parts of the prime motor and the machinery driven by it move, friction of bearing surfaces, and, finally, the resistances overcome in the materials, the change of form in which is the useful work performed.

The proper proportions of wheels cannot be attained without due consideration of the resistances in the two first categories, as well as those in the latter. It is doubtful, however, whether in the construction of ordinary machinery, all these elements are taken properly into account. In many instances we know they are not. The number of revolutions of a pinion driven by a spur wheel being established by the proper number of teeth in each, or the speed of pulleys being determined by their circumferences, all other considerations are too frequently lost sight of. In some cases the form of the teeth best calculated to secure least consumption of power from friction is properly taken into account; but even this is in most cases no more than approximated.

If we bear in mind the fact that increase of the perimeters in gearing is always accompanied by a reduction of pressure upon the teeth, and *vice versa*, the work performed remaining constant, it becomes evident at once that the diameters of wheels used to perform a given amount of work is an important element in determining their proper proportions.

As friction is independent of velocity and directly dependent upon pressure, it follows that reduction of pressure is also reduction of friction, and that the converse is also true. From this it will be seen that the larger the gearing employed to do a given amount of work the less will be the friction between teeth, all other things being equal.

Reduction of friction takes place in a system of pulleys and belts by increasing their size on account of the reduced tension of the belts necessary to do a given amount of work.

But increase of size implies generally increase of weight or pressure upon journals, and thus while there is diminution of friction between teeth, or of tension in belting, there will be more or less increase of friction upon the journals from this cause, so that on this account there must be a limit to economical enlargement. Again, increased size implies increased resistance from the medium in which the machinery moves, commonly the air, and this also fixes a limit to economical enlargement.

The ratio of the friction of a wrought-iron journal playing in a cast iron bearing, well oiled, is, according to Morin's experiments from ·07 to ·08 of the pressure. If the teeth of wheels are perfectly formed their friction ought to be nearly reduced to rolling friction, and the ratio of this to pressure is so slight that it need not perhaps be considered here. But such perfection is only theoretical, and there can be rarely found gears so perfectly cut that there is not more or less sliding friction between their teeth. The friction in journals, is, however, increased, all things else being equal, by diminished diameter.

A somewhat complicated mathematical formula would be required to express this relative increase, and we will not at this time enter upon its discussion. For practical purposes it is enough to say that when other considerations will admit, it will be found more economical of power, and more conducive to durability to allow a liberal size for toothed gearing and for pulleys than to scrimp the pattern.

THE LAW OF HYDROSTATIC PRESSURE.

The *Mining Journal*, of London, gravely publishes the following specification of a new motor, which, if it is a motor at all, is the long-sought for perpetual motion. The inventor says:

In carrying out my invention I avail myself of the property of bodies or objects of a certain specific gravity when immersed in a fluid of a greater specific gravity to rise or ascend to the surface of such fluid; this buoyancy represents a greater or a lesser force or power, according to the greater or lesser difference between the specific gravity of the object and that of the fluid, and the size or the displacement caused in the fluid by such object. In order to make the said objects, which I will call floats, as light as possible, and yet strong enough to resist the pressure of water, I construct them of thin sheet metal, and in preference in the form of tubes or hollow cylinders with conical or flat ends; a number or series of these cylinders are hinged or linked together in a similar manner as the buckets of a chain-pump; this chain or float is passed over two sets of pulleys, disks, or arms fixed to two horizontal shafts, the one placed vertically above the other, the said pulleys being formed to suit the shape of the floats; one half of this chain of floats passes through the center of the tank holding the water or other fluid, and the other half passes outside the tank through the air. The floats when in motion enter through the bottom of the tank in the manner hereafter described, and rise up by their buoyancy through the water; they then pass round the top pulley, descend outside the tank and passing over the bottom pulley, again enter into the tank, and so on. Now, the principal part of my invention consists in passing the float through the bottom of the tank. On the bottom of the tank I fix a barrel or cylinder; this cylinder may be square or any suitable shape to fit one or more of the floats, and conical at one or both ends to admit of the free ingress and egress of the floats, and on every float I fix an ordinary cup leather, either made of leather, india-rubber, wood, metal, or any other suitable material. Supposing the floats to be in motion, the one float passing into the cylinder before the other has passed out would prevent very little if any escape of water, which escape could be pumped by a small pump into the tank again. The motion communicated by the rising floats to the float pulleys, disks, or arms and shaft is further transmitted by means of belts or gearing in the manner usual with other motive engines. The details of arrangement and construction of my new motive-power engine may be altered or varied, but the main feature of my invention consists in passing the floats through the bottom of the tank. I do not confine myself to fixing the cup leathers, made either of leather, india-rubber, wood, metal, or any other suitable material, on the floats themselves, as I may in some cases fix the leathers, india-rubber, wood, metal, or any other suitable material in the barrel or cylinder at the bottom of tank, so as to form a water-tight joint round the floats passing through the cylinder or barrel.

We should not have called our readers' attention to this had it not been that the same supposed principle in various modifications has been lately several times submitted to us, in the supposition that it would really give motive power. In one case the liquid employed was mercury, and in another it was oil, etc., but the idea in each was that continuous motion could be obtained by the action of buoyancy alone.

Now what is buoyancy? The ordinary definition of it fails to give a proper idea of the true reason why a body immersed in a fluid of greater specific gravity, rises to, and floats upon the surface. In short, the term is one of those inefficient ones still retained in scientific language.

Let us suppose a U-shaped tube filled with water, the bend being at the bottom, and the tube stationary. The water will come to a common level in both legs of the tube. Now if we place a cork upon the surface of the liquid in one leg of the tube, the cork will, at first, sink a little, while the water in the other leg will rise a little and then remain at rest as before. Thus every vessel launched into the ocean raises the general level, while it sinks more or less into the water.

If by means of a wire the cork be forced down below the surface of the water the latter will rise in the opposite leg of the tube until its weight, in that leg, just equals the weight of the water and cork in the other leg, plus the weight of the wire or other force used to depress the cork.

From this simple experiment it can be at once seen that floating of the cork is the result of the upward pressure of the liquid in which the cork is immersed; which upward pressure is the result of an equal downward pressure in other portions of the liquid.

Mechanics are too apt to read the enunciation of the law by which pressure is transmitted through liquids without appreciating its full force. *Liquids transmit pressure equally in all directions.*

If buoyancy is the result of pressure it follows that no body or series of buoyant bodies can exert by virtue of their specific lightness an upward pressure greater, or as great as the weight of a mass of water equal to their aggregate bulk. To suppose they could exert an upward force equal to this bulk of water would be to suppose them destitute of weight.

In the invention, the specification of which we have copied above, the pressure of the supernatant column of water upon the area of the aperture in the bottom of the tank through which it is proposed to pass the floats, will always be greater than the buoyancy of the floats, and instead of the floats being drawn successively in, through it, they would be effectually prevented from entering. In short, neither mere pressure, nor buoyancy can, under any circumstances, produce motion, and the common mistake of the searchers after a perpetual motion is the non-appreciation of this fundamental fact.

Pressure may indeed be converted into motion, but when this is done it is no longer pressure.

A GOOD PIECE OF ENGINEERING.

Those who wish can see a good job in steam engineering at No. 9 Baxter street, in this city. They can, moreover, get some good hints as to how a boiler should be set, and how mixed fuel composed of shavings, sawdust, pea, and dust from anthracite, can be thoroughly and economically consumed.

The engine set up under the superintendence of F. W. Bacon, M.E., of this city, is from the manufactory of Woodruff & Beach, of Hartford, Conn. It is a horizontal non-condensing engine, with cylinder 24" by 48" making fifty revolutions per minute. The fly wheel is 16 feet in diameter, with rim 32 inches in width, turned smooth on the surface, and carries a 30-inch single belt running slack. The belt is 95 feet long and drives a pulley keyed into the main line of shafting, 5½ feet in diameter by 32 inches in width.

There are two boilers, each five feet in diameter, with 44 4-inch tubes 15 feet long. The shells of the boilers are made of the best three eighths-inch charcoal iron. These boilers are set according to Mr. F. W. Bacon's plan, illustrated in No 9, Vol. XVII of the SCIENTIFIC AMERICAN, and ordinarily carry from forty to fifty pounds of steam. The grate surface is 25 square feet for each boiler. The chimney is 110 feet high and 40 inches square on the inside. The smoke burning pipe is 8 inches in diameter, perforated with one fourth-inch holes' giving an aggregate area of 2 square inches to each foot of grate surface. Each furnace door has a 3·75-in. aperture which supplies air to a box the full size of the door, from which the air enters the furnace through one fourth-inch holes in the side next the fire, thus distributing the air over the top of the fuel.

The latter is, as we have stated, as incongruous a mixture as one could well attempt to burn in such a furnace, the sawdust and shavings being swept down from the floors of the wood-working shops in the building; but notwithstanding the smoke is with easy firing practically consumed, so little escaping that no annoyance is caused to those whose buildings are in the immediate vicinity.

One of the boilers has been found to give ample steam for 75 indicated horse-powers.

The whole is a model of good work, and is well worth the inspection of those about to place new horizontal boilers. It demonstrates indisputably the utility of the method of setting boilers above referred to.

THE SOLAR ECLIPSE.

The returns from the different scientific expeditions, have been only such as have been made in the daily papers and the details are extremely meager.

From Springfield, Ill., Louisville, Ky., Des Moines, Iowa, Wilmington, N. C., Vincennes, Ind., Raleigh, N. C., Ottumwa, Iowa, and other prominent points comes the welcome news that the day was beautifully fair and the observations were made under the best possible circumstances.

The principal points to be determined in the observation of this eclipse, were first and foremost, the nature so far as could be ascertained of the rose-colored prominences, second, the true nature of the *corona*, and, third, the existence or non-existence of planets between the orbit of Mercury and the sun.

The belief that the corona is concentric with the sun will be open to question, if the reports that reach us are correct in regard to the appearance presented by it in this eclipse. The form is stated to have been rhombidal rather than circular, as hitherto observed.

The rose-colored protuberances appeared to the number of five or six. The result of the observations made upon them are not, however, yet sufficiently collated to justify any positive conclusion. So far as we can gather, no planets within the orbit of Mercury were discovered.

It is reported that one of the observing party at Shelbyville, Ky., observed eleven bright lines in the solar spectrum, thus adding six to the five already determined. Meteors were also observed passing between the earth and the moon. General success seems to have been secured in taking photographs and in all the other methods of observing.

THE REMOVAL OF THE TARIFF ON COAL.

We wish to be distinctly understood as not advocating the removal of the tariff on coal because we believe its removal will affect the prices of coal in the United States. The Nova Scotia coal cannot successfully compete in quality with the anthracite brought into this market. The reasons for our position are two: First, we maintain that combinations which ignore the public interest are not entitled to even a show of protection. Second, we would like to see the public convinced by an experiment that the great outcry that has been made against this tariff has been founded upon a false and exaggerated estimate of the power supposed to be put in the hands of coal monopolists by the tariff.

There is in circulation a report that the Pennsylvania coal dealers have arranged to buy up the Nova Scotia mines so as to have the absolute control of the whole Eastern market. We do not credit this rumor, which is probably a sensational production of the correspondent of the *Halifax Reporter*, in whose columns the report first appeared. It is undoubtedly intended to highten public feeling in regard to the present status of affairs, and may accomplish that end, but before we believe it we must have better evidence than we have yet seen.

THE ALBANY AND SUSQUEHANNA RAILROAD.

The public mind is excited, and the reputation of the Empire State scandalized, by the recent shameful transactions on the Albany and Susquehanna Railroad. Whatever may be

the merits of the case, one thing is certain, the power of granting injunctions, now vested in the judiciary, affords opportunities for bold and unscrupulous operators to embarrass the transactions of rival interests, which, in our opinion, ought to be curtailed.

It only seems necessary to trump up a series of charges with or without basis, to obtain an injunction, and the appointment of a receiver, who forthwith takes possession and ousts the holders of the coveted property.

In this case the citizens of Albany have been told by one of the high contracting parties, that the former superintendent of the road is a poor railroad manager, who has been running the road against the interests of the stockholders—a veritable King Log, for whom they are kindly offered in exchange a King Stork. Not having lost confidence in Mr. Ramsey, or having much reason to repose confidence in Mr. Fisk, they reject the offer. Whereupon all the forces at the command of both parties, legal and otherwise, are marshalled in battle array, and a series of disgraceful encounters have taken place.

We have neither time nor space to review the history of these transactions, but their effect upon the morals of the community cannot but be disastrous, while the confidence of the public in railroad management must be more or less shaken. What the final result will be, time will show. Meanwhile the action of Governor Hoffman, in taking possession of the road and appointing Gen. McQuade Superintendent, will meet hearty approval. It is about time that some check was put upon the conspiracies now going on in connection with railroad transactions.

THE LIGHT HYDROCARBONS.

There is a considerable number of hydrocarbon oils (popularly spoken of as the light hydrocarbons on account of their low specific gravity) of mineral origin. That is, whatever their original source, upon which point there has been much speculation, they are now found collected in the earth, either free or mixed with other mineral substances.

The increasing use of these oils and the great number of their derivatives applicable to industrial purposes, renders them second in importance to very few known mineral products.

The oldest known oil of this kind was, we believe, discovered in Persia, and it received and has retained for ages the name of naphtha. This oil is a volatile, light-yellow, transparent liquid, with a strong odor, characteristic of most oils of its class.

The art of distilling similar oils from coal tar, was developed later, and the same term was applied to the light products of such distillation, the heavy products being called dead oil and asphaltum.

Still later it was found that coal would, when distilled, yield similar oils, and the term naphtha was applied to the light oils obtained from coal.

The next step was the distillation of petroleum, and still the term naphtha was made to do duty for the light distillates. This term is then popularly applied indiscriminately to a large number of hydrocarbons, which yet have marked points of difference, the most general and prominent distinction being that based upon specific gravity.

It is true that there are some distinctive terms applied to classes of these oils, but these are in some cases erroneous, and in others too indefinite. Benzine or benzole is one of these terms popularly applied to all hydrocarbon oils ranging in specific gravity from 45 to 80 degrees Baumé.

The term gasoline is strictly applied to oils ranging from 80 degrees Baumé upwards to sometimes as high as 90 degrees. But we have often heard it improperly applied to those of a less specific gravity than 80 degrees.

These oils as found in market are all complex mixtures of different oils. It has been asserted on good authority that each of them contain, in various proportions, at least twelve different hydrocarbons whose boiling points range from 32° Fah. to 318°, eight of them boiling at lower temperatures than water.

The naphthas are all highly inflammable, but they are not in themselves explosive. The lighter ones are, however, very volatile, and their vapors when mixed with air in the proper proportions to afford complete combustion, are highly explosive. They are also very difficult to keep in anything but hermetically sealed vessels of a material impervious both to the oils and their vapors. Nothing so porous as wood in its natural state will hold them, and for the most part they are put up in tight-sealed tin cans. Cans which have contained these oils and which have had left in them a small residue, are the most likely to contain an explosive mixture of air and hydrocarbon vapor.

The light hydrocarbons may, however, be safely used for lighting purposes in apparatus specially designed to convert them into vapor, which vapor is passed through pipes and burners like ordinary illuminating gas. The latter is very explosive when mixed with common air in the proper proportions, but it is undoubtedly the safest illuminating agent devised up to the present time. The safety consists in the use of the proper appliances for its consumption.

Whenever these light hydrocarbon oils are used for consumption in lamps, there must, from the nature of the case, be great danger. There is the partially filled lamp, its open space filled with vapor, and communicating with the external air, and the flame in close proximity to the explosive mixture that must inevitably be sometimes formed. Although there may be many exemptions from disaster, there is always in such cases an immediate risk, and although the papers constantly give us accounts of serious casualties resulting from such causes, their frequency does not surprise us so much, as that they are not far more frequent, taking into account the character of the oils so largely sold to a gullible public.

THE PROPOSED TUNNEL UNDER THE BRITISH CHANNEL.

This long talked of and much-mooted proposition seems at length to have reached a stage of definite action. From an article in *All the Year Round* we are enabled to gather something as to the possibility of its achievement. Demonstrated possibility, joined with desirability, seems, at the present age to be all that is necessary to initiate any engineering enterprise.

The conditions on which the success of this enterprise depend are comparatively few and simple. The first condition relates to the geological formation in which the work would have to be done.

It has frequently been pointed out, and there appears to be no difference of opinion on the subject, that there are to be found, on opposite sides of the Channel, tracts of coast presenting geological features almost identical. The English coast between Deal and Folkestone, for instance, corresponds in every particular with three miles of the French coast, a little to the westward of Calais. That the same formations continue under the bed of the sea is a probability that has been noticed in a report to the Geological Society on "The Chalk Ridges which extend parallel to the Cliffs on each side of the Channel tending towards the North Sea," by Captain J. B. Martin, in 1839. Careful geological investigation has been made with a view to discover whether the chalk formations obtaining on each coast continue unbroken for the whole distance dividing them; and there appears no reasonable cause of doubt that this is the case.

Impressed by these facts, Mr. William Low, an engineer who for many years had been confident of the feasibility of connecting the English and French railway systems, by means of a sub-channel tunnel, set himself earnestly to examine for himself the geological formations of the two shores. After most careful examination, Mr. Low became satisfied that the deductions of the geologists were correct. His examination of the borings for several artesian wells on both sides of the Channel, strengthened his opinion as to the regularity of the strata. It became his firm conviction that along a certain line, about half a mile west of the South Foreland, and four miles west of Calais, the tunnel could be made entirely through the lower, or gray chalk, which, owing to its comparative freedom from water, and other qualities, would be a most desirable stratum in which to work. With the result of these investigations, and with plans of the tunnels he projected, Mr. Low, in 1867, betook himself to the Emperor ofthe French, who, giving the English projector a cordial reception, desired him further to organize his plans, and to come again when he might be prepared to submit definite proposals.

In 1856, M. Thomé de Gamond, a French engineer of repute, who had for many years been advocating the construction of a tunnel between England and France, obtained, by order of the Emperor, an investigation of his plans at the hands of a scientific commission. This body, satisfied with the substantial accuracy of M. de Gamond's geological conclusions recommended that his investigations should be practically tested by sinking pits on the two coasts, and driving a few short headings under the sea at the expense of the two governments. Owing possibly to the backwardness of the Great British Circumlocution Office, this recommendation does not appear to have had any practical result. In 1857, M. de Gamond published the upshot of his researches, and the report of the commission: and at the Paris Exposition of 1867, he publicly exhibited his plans. It was very natural that Mr. Low, after his interview with the Emperor, should put himself in communication with M. Thomé de Gamond. This gentleman unreservedly placed his experience at Mr. Low's disposal, and, after a time, the results of their joint labors were laid before Mr. James Brunlees. He, after careful examination, consented to co-operate with the two engineers in the prosecution of the work. A committee of French and English gentlemen of influence and position, was, by desire of the Emperor, formed to further the project; and it is by the executive committee of this body, under the chairmanship of Lord Richard Grosvenor, that the matter is now practically brought before the public.

But the opinions of Messrs. Low and Brunlees, and of M. Thomé de Gamond, received further confirmation.

Mr. John Hawkshaw, whose name is well known to the public at large and to the engineering world, was induced to test the question, and to ascertain by elaborate independent investigation, the possibility of a sub-channel tunnel. With characteristic care and caution he took nothing for granted, but went himself over the whole ground already traversed by Mr. Low and by M. de Gamond. His geological researches led him to the same conclusions, and his expression of opinion in favor of the gray chalk was very decided. Not even satisfied with the theoretical results of these investigations, carefully though they were made, Mr. Hawkshaw held it necessary to make borings on each coast, at the precise points at which the ends of the tunnel would be situated. Thus Mr. Hawkshaw and the French commission came to the same decision. Now, the well at Calais, from which a considerable part of the geological inferences had been drawn, was at some distance from the spot where it was proposed to begin the tunnel on the French side, and possibly the strata might, in the precise place indicated not run as anticipated.

This did not, however, turn out to be the case. The actual borings conclusively proved the correctness of the views entertained.

The boring on the English coast was commenced at St. Margaret's Bay, near the South Foreland, in the beginning of 1866, and was satisfactorily completed in 1867. It was carried completely through the chalk and into the green sand, which was reached at a depth of five hundred and forty feet below high water. The boring on the French coast, three miles westward of Calais, was carried to a depth of five hundred and twenty feet below high water. It was intended to pass through the chalk as on the English side, but accident frustrated this design.

Simultaneously with these borings the bottom of the Channel was carefully examined by means of a steamer provided with all suitable apparatus. The main useful results established by these experiments appear to be, that on the English coast the depth of chalk is four hundred and seventy feet below high water, of which two hundred and ninety-five feet are of the gray formation, in which it is proposed to work; that on the French coast, the depth of chalk is seven hundred and fifty feet, four hundred and eighty being gray: and that there appears to be no room to doubt the regularity of the strata between the two shores along the line proposed.

So, it would seem, firstly, that the chief condition is satisfactorily insured, and the geological formation of the sea's bed is such as to admit of the excavation of a tunnel through the lower gray chalk; and secondly, that it is not necessary to go to a depth unsuitable for railway traffic. It is calculated that the approaches to the tunnel can be constructed at gradients not exceeding one foot in eighty.

The next point of paramount importance to the traveling public is the question of the safety of the tunnel when made. The dangers most carefully to be guarded against are two: any possible irruption of water from the sea, or from unexpected land-springs; and any deficiency in ventilation.

Engineers are of the opinion that these dangers can all be provided against. Recent borings on either side of the Channel have proved that there need be no fear of land water, and the impermeability of chalk and the depth below the bottom of the sea, at which the tunnel will be placed, being in no case less than one hundred feet, it is maintained that there would be no danger from incursions of the sea water. The submarine excavations in the Cornish mines are an existing demonstration of the safety of the proposed tunnel.

Ventilation will be secured by means of powerful steam engines, and attempts to raise the necessary funds are wisely to be postponed until two small headings, or galleries, are driven from each country, connected by transverse driftways. Ventilation would thus be secured in the manner customary in coal mines and works of a similar nature, and the feasibility or otherwise of connecting England and France by a tunnel can be demonstrated.

The New Postoffice for New York.

The long-talked of and prayed for new Postoffice was commenced on the 9th inst. The grounds situated at the lower end of the City Hall Park, opposite the SCIENTIFIC AMERICAN office, are now inclosed by a high board fence, within which a large number of laborers are engaged in the preliminary work.

The new building is to have frontages on Park Row, on Broadway, on the Plaza to be laid out between it and the City Hall (or in a straight line across the Park), and on the curve at the southwesterly terminus of the Park. The style of architecture will be *renaissant*. The material of the edifice is to be a light-colored granite, and, in shape, the building will be conformable to the area of the plot of ground to be built upon. It is to have three stories and an attic over the street level, and a deep basement. The roof will be of the Mansard style. The basement and first story of the building are to be devoted to postoffice purposes exclusively; the second story will contain court rooms for the United States Courts, offices for the United States Marshal, etc., the money order and registry departments of the Postoffice and the private offices of the Postmaster; the third story will comprise principally the offices of the judges and other officers of the Federal courts, and the attic rooms will be fitted up as places of deposit for Federal records, etc.

The plans for the new building will be ready for the contractors in about one month hence. The excavation for the edifice is to be thirty feet in depth, and will require the removal of more than 50,000 cubic yards of earth, as there are to be a cellar and sub-cellar. The plans are all to be drawn under the direction of Mr. A. B. Mullett, the supervising architect of the Treasury Department, who has taken rooms at the Astor House in order to be near the scene of operations while the construction of the building is going on.

An important suggestion has been made (but it is only a suggestion as yet) to connect the basement of the new Postoffice with the press and mailing rooms of the prominent newspaper offices, by an underground pneumatic railway, so that there may be no delay in sending off the editions of the papers which go to the various parts of the country by mail. If the proposition be acted upon, much time will be saved to the newspaper establishments, the extra handling of the papers being avoided, and the prompt delivery of the morning journals all along the different mail routes will be assured.

Mr. Mullett hopes to have the whole building ready for occupancy by September, 1871. He is assisted in his labors by Mr. Hulburd, who superintends the erection of the building; Mr. Judson York, assistant supervising architect, and, in the absence of Mr. Hulburd, acting as superintendent; and Mr. John F. Ames. With such capable and thorough assistants, it may be regarded as certain that Mr. Mullet, whose energy is well known and highly appreciated by the Government, will push forward the work to a speedy completion, and that, when pronounced ready for occupancy, the edifice will be an ornament to the city.

There are also to be important changes in the laying out of the City Hall grounds, and Broadway, from the lower corner of the Plaza to Chambers street, will be widened forty-two feet.

Storms in the Sun.

We now know that our own sun (resembling in this probably most other solar bodies of the same kind) is in so highly fluid and excitable a condition as to be constantly sending out from its surface forked tongues (thousands of miles in extent) of inflamed hydrogen gas, like the flickering streams of light from the stars of a street illumination; and, moreover, as to be subject to great periodical disturbances, now called "magnetic storms, which are in all probability caused by certain combinations in the movements of those little solid bodies, on one of which we live, round the sun. Even now one such epoch of magnetic storm seems to be thought pretty near at hand. The sun has been lately exhibiting the most surprising forms of disturbance, and presenting to scientific eyes less "fixity" of essence than ever. Spots so vast that we must estimate their dimensions by millions of square miles, have broken out from time to time, and have presented rapid changes of figure, indicating the action of forces of inconceivable intensity. Clusters of smaller spots, extending over yet vaster areas, have exhibited every form of disturbance known to the solar physicist, and every degree of light, from the apparent blackness (in reality only relative) of the nuclei, to the intense brillancy of the faculous ridges. And we now know that these appearances are not merely matters for the curious, with which, as they happen at a distance of above ninety millions of miles, practical men need not concern themselves. This much, at least, is certain, that the vast changes now going on in the physical constitution of the sun are changes which do most powerfully affect the electric condition of our earth, which have in former years caused the most violent disturbances in the various artificial as well as natural electric apparatus of the world we live in, and which, to speak of the least of all its possible effects, might, just as well as not, happen some day to throw the electric condition of every telegraphic cable on our planet, under the sea or above it, in the most dire confusion, and send down telegraphic companies' shares to zero in a lump, even if they did not contrive to telegraph to us, after some strange inarticulate fashion that shares in all public companies, even in that very limited public company, the human race, are, in a physical point of view, of very doubtful value indeed. Let us explain briefly to what we allude.

On September 1, 1859, shortly before noon, two astronomers —Messrs. Hodgson and Carrington—one at Oxford, the other in London, were at the same instant scrutinizing a large group of sun spots. On a sudden two intensely bright patches of light appeared in front of the cluster. So brilliant were they that the observers thought the darkening screens attached to their telescopes must have become fractured. But this was found not to be the case. The bright spots indicated some process going on upon the sun's surface—a process of such activity that within five minutes the spots traveled over a space of nearly 34,000 miles.

Now, at the Kew Observatory there are self-registering magnetic instruments which indicate the processes of change by which the subtile influences of terrestrial magnetism wax and wane. At one time the line traced by the pointer will be marked by scarcely perceptible undulations, indicating the almost quiescent state of the great terrestrial magnet. At another, well-marked waves along the line exhibit the pulsations of the magnetic system, influenced in a manner as yet intelligible to the physicist. And then there is a third form of disturbance, the sharp, sudden jerks of the pointer exhibiting the occurrence of those mysterious phenomena termed "magnetic storms."

When the records of the Kew Observatory came to be looked over, it was found that at the very instant in which the brilliant spots of light had appeared to Messrs. Hodgson and Carrington, the self-registering instruments had been subjected to the third and most significant form of disturbance—a magnetic storm began, in fact, as the light broke out on the sun's surface. But this was not the only evidence of the sympathy with which the earth responded to the solar action. It was subsequently found that soon after the spots of light had appeared the whole frame of the earth had thrilled under a mysterious magnetic influence.

At the West Indies, in South America, in Australia, wherever magnetic observations are systematically made, the observers had the same story to tell. In the telegraph stations at Washington and Philadelphia the signalmen received strong electric shocks. In Norway telegraphic machinery was set on fire. The pen of Bain's telegraph was followed by a flame. And wherever telegraphic wires were in action, well-marked indications of disturbance presented themselves. Even this, however, was not all. The great magnetic storm was not a mere instantaneous electric throe. Hours passed before the disturbed earth resumed its ordinary state. And thus it happened that in nearly all parts of the earth night fell while the storm was yet in progress. During the night magnificent auroras spread their waving streamers over the sky, both in the northern and the southern hemisphere. As the disturbed needle vibrated, the colored streamers waved responsive, and it was only when the magnetic storm was subsiding that the auroral lights faded from the heavens. Now, it is evident that these phenomena show the most intimate relation between these peculiar disturbances in the sun and the magnetic currents of our own earth. Directly one of these changes takes place upward of ninety millions of miles away, the electric condition of our planet is changed in some mysterious way, of which our instruments, and even the condition of our sky, bear record.

The pens of all our telegraphic wires may some day trace in flame a handwriting more ominous of human destiny than was the handwriting which during Belshazzar's feast traced a warning on the wall of the fall of the Babylonian dynasty. Moreover, note this, that these changes in the condition of the sun take place at intervals of about eleven years. The variable star which swings round it, as well as supplying us with light and heat and (apparently) magnetism, clouds over every eleven years these spots, so that it seems most likely that every eleven years certain magnetic conditions recur which have not occurred in the interval. If so, perhaps, the magnetic excitement of 1859 will recur, and it may be in much greater force next year—in 1870. And if it does, how are we to say what may or may not recur with it?

Type Setting by Machinery.

The following is a description from the *Scientific Opinion* of an invention recently patented: The type pockets are stationary, and are arranged in a circle or a portion of a circle around or over a revolving wheel or frame, the wheel carrying a number of pickpockets, each of which is capable of withdrawing type from one of the pockets, the precise pocket upon which each pickpocket shall operate, being in one arrangement determined by the position of the perforations in a strip of paper acting in concert with a system of levers and triggers or fingers in manner as, or nearly as follows: The systems of perforations which the inventor found suitable was similar to that used in a former apparatus, in which each letter or sign is represented by two or more perforations, the distinctions between the several letters or signs being effected by changing the positions of the perforations from one to another of a series of straight lines or imaginary lines, as, for example, fourteen, which number will, in ordinary cases, be found to be sufficient. The strip of paper thus perforated is passed by an intermittent movement over a perforated drum or plate and into contact with a series of fourteen pins attached to, or formed on, a corresponding number of levers or triggers, each movement of the paper bringing two perforations opposite to two of the pins, which said two pins enter the said perforations, and the corresponding levers move into position to set one of the pickpockets.

Bleaching Ivory.

The following recipe for bleaching ivory is said to be very satisfactory: The ivory, when cut into plates of the proper thickness for keys, is placed in a flat vessel, and a solution of carbonate of soda, in the proportion of ten ounces of soda to two pounds of soft river water to each pound of ivory is poured over it. This is allowed to remain for 36 or 48 hours, after which the solution is to be poured off and the ivory washed several times in cold, soft water. After this it is to be again immersed in a solution consisting of three quarters of a pound of sulphate of soda, and two pounds of soft water, to a pound of the ivory, and allowed to remain five or six hours. Two ounces of hydrochloric acid, previously diluted with four times its weight of water, are then to be stirred in, and the vessel covered with a tight-fitting cap, and allowed to remain 36 hours. The liquid is then poured off, and the ivory plates well washed and dried in the air. Should the desired degree of whiteness not be obtained by one operation, it can be repeated until successful. As the gases generated during the process are injurious to the lungs, it will be readily understood that the operation should be conducted in the open air or in a chimney, where the fumes can be carried off.

Patent Bottle Stopper.

A new safety stopper for bottles has been patented in England. It is composed of a short vulcanized india-rubber or cork tube, in the upper part of which is inserted a metallic ring, on which this tube is kept fast by any suitable means, either by binding, spurs, expansion, etc. A screw-tapped peg with a conical head is inserted upwards in the india-rubber tube, through which it runs, and is provided with a round screw nut at its upper part. This tube so fitted, is inserted in the neck of the bottle to be stopped, and the screw nut being turned to the right with the fingers causes this screw-tapped peg to move upwards; the conical head of the latter entering gradually in the india-rubber tube presses it against the internal side of the neck at the very place where this neck is conical, and the bottle is hermetically closed, because the conical head of the peg presses against the india-rubber or cork tube in its whole periphery against the conical neck of the bottle. To open the bottle, the screw nut must be turned to the left; then, by pushing down the peg, its conical head comes out of the rubber tube, and the stopper is easily removed.

Profits of Small Inventions.

Hiram Tucker lately applied for an extension of his patent for a Spring Bed Bottom. The invention consisted in supporting the ends of wooden slats on stirrup springs. It appeared from the patentee's sworn statement that he had cleared in profits from his patent over one hundred and twenty thousand dollars.

Judge Fisher, the Commissioner of Patents, decided that the invention was not one of great importance to the public, that the patentee had not expended an extraordinary amount of time, ingenuity, or expense upon the invention, and that the profits already made were an adequate compensation. The application for extension was therefore rejected.

FOR the sake of the future cleanliness of the city, we are glad to chronicle the fact that a new Postoffice is about to be erected upon the lower point of the City Hall Park. Already the filthy apple, peanut, and ice-cream stalls are cleared away, and in their stead we can look out upon a clean board fence. The municipal authorities of this city are constitutionally wedded to all sorts of nuisances, and it is vain to expect, or even hope for anything like good order, either in the streets or other public places under city control.

PAPER FROM SHAVINGS AND SAWDUST.—Dr. Matthiessen, a well-known *savant*, now appears in the character of an inventor and patentee in England of an important improvement. He submits wood when in a state of division, such as shavings, sawdust, or disintegrated wood, to what is known as a rotting process—that is to say, the wood in a state of division is steeped either in running or stagnant water, and is allowed to undergo a rotting or fermenting process, by which process certain constituents of the wood will be decomposed and removed, and the subsequent treatment of the residual ligneous fiber for the production of pulp or paper will be thereby rendered more economical, and the process of boiling and bleaching is more easily effected.

BROADWAY has been re-paved from Bowling Green to Union Square at a cost of very nearly $463,000. The work was commenced in the month of June, 1867, and has been going on wearily ever since, very much to the inconvenience and annoyance of those who crowd that busy thoroughfare.

IN estimating the practical value of any science, something more than the mere material results of its application must be taken into account. It must be credited with whatever aid it affords to its sister sciences.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

The prospectus of the West Indian and Panama Telegraph Company has been issued. The design of the company is to connect South America with Europe and the United States by means of a cable from Cuba to Central America.

It is stated that the thick tough sap found in large quantities in the leaves of New Zealand flax, may be converted into a gum for sealing envelopes, which, when dry, unites the surfaces of paper so thoroughly that no process of steaming or soaking will permit them to be separated again. For this reason, it is now being used in large quantities in England, in the preparation of what are called "safety envelopes."

An important reduction in the charges for messages by the old Atlantic cable has been made. Since August 10, dispatches could be sent at the following rates: Thirty shillings sterling, or $7·50, gold, for ten words; and three shillings sterling, or seventy-five cents, gold, for each extra word. Press messages are sent at one half the above rates.

Mr. Welborn, in the *Deutsche Ind. Zeitung*, says that proto-sulphate of iron can be absolutely preserved from oxidation by placing with it a piece of camphor wrapped in a piece of clean and dry paper.

Wooden toothpicks are made by patent machinery, and the manufacture of these articles is principally, if not wholly, carried on at an establishment near Boston, which has been in operation for four years. The aggregate number sold is quite large, sometimes amounting to five millions a day.

A light-house is being erected at the south-west pass, in the Mississippi river. It will be of cast iron, and the work will be completed as speedily as possible.

The recent exhibition of textile fabrics in Cincinnati shows that the South is largely extending its cotton manufactories. According to the latest reports, Georgia has forty-seven cotton mills; South Carolina, forty; Missouri, twenty-seven; Alabama, eleven; Tennessee, forty; and there are also many mills in North Carolina and South Carolina. The product generally is fine shirtings and sheetings, and the specimens exhibited at Cincinnati compared favorably with the goods from the New England manufactories.

In nineteen years there has been an increase of 1,817 factories and 261,882 hands in connection with the textile industries of Great Britain. The number of spinning spindles during the same period increased from 25,638,716 to 41,516,484; and the number of power looms from 301,443 to 549,365. The motive horse power increased from 1850 to 1868 as follows:—Steam, from 103,113 to 332,851; water, from 26,104 to 29,830.

An international exhibition is to be held in Turin, in 1872, to commemorate the completion of the Mont Cenis tunnel.

The tunnel of the Marietta (Ohio) Railroad is cut under a well of excellent water. The well is as good as ever, and not a drop leaks through, although trains pass directly under it.

Iowa will soon have four railroads connecting the Mississippi and the Missouri rivers. The great central line extending from Davenport to Council Bluffs, is just completed and in successful operation. Two others, one beginning at Dubuque, and already built to Fort Dodge, and the other at Burlington, will be completed in a few months.

The Common Council of Newark have adopted a resolution to commence an action against the Newark and New York Railroad Company for a violation of the provisions of their charter of the City ordinance, by crossing Hamilton street at such an angle as to practically destroy its value for public travel.

The manual labor system at Cornell University appears to work well. One student supports himself by cabinet making, another by printing, another by photography, while others work on the farm. One young man who sweeps the rooms and makes fires has taken the first prize in science and German.

The seventh Industrial Exhibition of the Mechanics' Institute of San Francisco, will commence in that city on the 14th of September, 1869. The building cost $45,000, and covers an area of 70,000 feet.

St. Louis, anticipating shipments of silver ore from Colorado as soon as the Kansas Pacific Railroad is finished to Denver, is about to erect smelting furnaces to meet the requirements of the expected new branch of industry.

On a farm at Ida, Monroe County, Michigan, there is an immense block of granite which is an object of curiosity. The stone is about 40 feet high, 50 feet long and 20 feet wide, and upon the surface, which is as smooth as a planed floor, there can plainly be seen the foot-prints of an immense bear.

The Portland and Kennebec Railroad Company is putting a monster trip hammer into its machine shop at Augusta. It was purchased in Philadelphia, and cost $3,000. It weighs twenty-three tuns, and will strike a blow of 2,000 pounds, and may be graduated to strike with a force anywhere from 2,000 pounds to one pound.

The Royal assent has been given to the bill for the purchase of the British telegraph lines by the Government.

The Liverpool Chamber of Commerce has resolved to send a circular letter to the chambers of commerce in this country, advocating the discontinuance of the weighty and unnecessary covering, and heavy iron bands on cotton bales, and suggesting the adoption at American ports of the same system for the allowance of tare which prevails in England.

A dispatch from Lisbon states that a French company offers to form a telegraph line from Lisbon and Gibraltar to England and America, on a twenty years' concession and without subsidy.

The New York State Agricultural Society will hold its twenty-ninth annual exhibition and fair at Elmira on the 14th, 15th, 16th, and 17th days of September next. Exhibitors or persons intending to present animals or articles for exhibition are required, by a rule of the Society, to make their entries on or before Saturday, the 24th inst.

Cars fitted with chairs are now run with the 12 o'clock night train over the New Jersey Railroad. These cars are intended to answer the purpose of sleeping cars.

A strike is in progress among the miners of the White Pine gold regions. A large number of miners are at work, however, at $4 per day, and it is thought that the dissatisfied workmen will finally be compelled to return to their labors at the same rate. The miners already at work have formed a protective society, and promise to resist any infringement of their rights by the Miners' Union.

The Viceroy of Egypt has ordered a large quantity of sugar-making machinery from a Paris firm. The total amount of the order is about $3,000,000.

An addition of glycerin to the glue and molasses of which printers' ink rollers are usually made is said to act very beneficially, and removes all endency of the rollers to become hard, or to dry and crack.

The Indiana State Geologist, Professor E. F. Cox, has returned home after quite an extended investigation in the counties of Owen, Clay, Vigo and Parke. He found large deposits of coal and considerable iron ore in all these counties, and traced the belt of block coal from the south-western portion of Owen County up into the extreme northern corner of Parke, while it is his belief—and some little surface investigation has supported the idea—that the block coal extends as far north as Fountain.

A petition is circulating for a light-house and fog signal at Ash Point Island, in the Muscle Ridge Channel, Maine. One important fact stated in connection with the necessity for a light and fog signal at this point is, that during the year ending June 30th, last, 31,401 vessels passed Owl's Head in the daytime, and the number of vessels navigating these waters is said to be increasing at the rate of 3,000 a year.

The great needle manufactory of Carl Schleicher, in Schonthal, near Duren, on the Rhine, exported in the year 1868 no less than 340,000,000 of sewing needles, which were disposed of in various parts of the continent of Europe, in North and South America, and in Africa.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; beside, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however when paid for as advertisements at $1·00 a line, under the head of "Business and Personal."

☞ *All reference to back numbers should be by volume and page.*

C. B. F., of Mo., says: "1st, I am about to build a house and wish you to inform me if it is good to build the basement wall of concrete? Is it practicable, durable, and cheap, and how made? 2nd. I think of building my cistern above ground, a wood tank four feet from the ground, and run the water to any part of the house through pipes, for drinking purposes, the pipe to be large enough to hold say two palls of water, laid four feet deep under ground to basement. Will it be as cool as the water in an under-ground cistern?" ANS.—1st. It is common in this part of the country to build foundations of concrete, composed of lime, sand, water, gravel, and round or broken stones. A trench of boards is first made of the width of the desired foundation. Fill the trench with the concrete to the depth of a foot and let it stand for a day or two, or until sufficiently hard; then put on another foot of concrete, and so go on, adding concrete and raising your trench boards as the wall rises. 2d. If the water had to pass through a considerable extent of pipes underground it would be measurably cooled. But in your case you will get little or no benefit in the way of cooling.

A. R., of N. Y.—We are informed by parties who are authorities on the subject, that the life of oak ties will scarcely exceed in the average, eight years for white oak and five years for red oak, although the best white oak will sometimes last twelve years in exceptional cases. They could scarcely be bought for less than from forty-five to fifty cents each for 7½ feet, 6 inches face and 6 inches in depth. The objections you name to stone ties are sufficient to condemn them but they have been obvisted by the interposition of an elastic substance between the rail and the stone block, and this has been accomplished at an expense that perhaps does not render the scheme impracticable, taking into account the greater durability of a permanent way made of such material. But the great, and as yet unsurmounted obstacle to the use of stone, is the proper confining of rails to the stone blocks. Nothing yet devised has met this requirement.

C. D. M., of N. J.—A plumb line does not always hang in a perpendicular to the earth's surface. It has been observed to deviate from this line in the vicinity of large mountains, being attracted by their masses, and the Director of the Imperial Observatory, at Moscow, in Russia, has found in the immediate neighborhood of that city a deviation of nineteen seconds, decreasing in different places to eight seconds, from the spheroidal perpendicular. These deviations are not caused by proximity to mountains, but are attributed to subterraneous cavities in the earth under the city, either filled with air or water. Very slight deflections in the plummet have also been traced to the attractions of the sun and moon.

C. H. P., of Ill.—A good liquid blueing, free from acids, is the soluble, or basic Prussian blue, otherwise the ferrocyanide of potassium and iron. This substance is perfectly soluble in pure water, and may be made by adding to a solution of pure protosulphate of iron, a solution of ferrocyanide of potassium. A white precipitate will be formed which may be separated by filtration and washed. It becomes blue by exposure to the air, and may be dissolved in pure water as required.

S. C. L., of Mich.—Capillary attraction does not exist between all liquids and solids. It is one of the manifestations of the attraction of adhesion, and as this attraction does not exist between certain liquids and solids, there can, in such cases, be no such thing as capillary attraction. You can raise alcohol through a glass wick composed of tubes having a very fine bore. The heat of the flame will, however, be apt to fuse and close the upper ends of the tubes.

E. W., of Ohio.—Any kind of glass properly annealed can be easily drilled, but it cannot be made so tough by any process now known that it can be riveted. Perhaps, however, you mean to ask whether glass can be joined by metal rivets; if so, yes.

E. S.—A method of casting by compression is one of the new things of the age. Potters' clay is used for the molds, and the metal is forced in at the bottom by a cylinder and piston. The fineness of this kind of casting excels every other method known. By it the finest engravings can be accurately copied.

N. B., of Del.—If any one sends us a letter that contains sixteen distinct inquiries, we promise in advance that we will not answer them. There is a reasonable limit to which our time and patience can be taxed, but beyond that we are as likely to get cross as other good men.

S. T. M.—If you have an instrument, as you say, that will quickly and accurately divide a circle into any given number of equal parts, without the trouble of spacing with dividers, and is at the same time cheap and portable, it is something that is wanted and will sell readily.

D. E. F., of Ala.—There is no solvent that will reduce carbon to a liquid state without combining with it chemically. The bisulphide of carbon is a chemical compound, not a solution.

T. D., of Ohio.—You are right in your opinion. The quacks you allude to will never help your eyes. The only thing you can do is to use the best spectacles you can procure.

R. J., of Ky.—You will not succeed well in your attempt to grind brass cocks tight with emery. A much better material is molders' sand or pounded glass.

R. C. Y., of Miss.—Salt exists in the form of minute dust in the atmosphere, near bodies of salt water, being carried up in the form of salt spray by the winds.

D. P., of Vt.—A ball rolling down an inclined plane does not press against the surface of the plane with a force equal to its weight. A reference to some good text book on physics will set you right on this point.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per line will be charged.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

TRUCK PLOW.—M. Mickelson, Ashland Mills, Oregon.—The object of this invention is to provide improvements in plow trucks, calculated to facilitate the management of the plows connected to them, in guiding and adjusting them so as to take more or less land, the tongue being rigidly connected to the beam when properly adjusted. Also, in adjusting the plows relatively to the depth of cutting and for raising them out of the ground. Also, for adjusting the wheels of the truck so as to support the axle and the body of the truck in a horizontal plane, either when both the wheels run on the surface in making the first furrow or after the first furrows has been made and one wheel runs in the furrow.

HAY FORK.—Newell Hinman, Sparta, Mich.—This invention consists in the arrangement of a pair of branched curved tines, forming a bifurcated shank, to which the rope and locking device are attached, and another short tine, bent in the opposite direction, is jointed.

SEED AND MANURE DROPPER.—John G. Ham, Newnan, Ga.—This invention consists of hopper supported in front on a wheel, and in rear provided with two or more plows, or cultivators, and operating handles, the said hopper being provided with an adjustable passage through the bottom for delivering the seed or other matter, in which passage one or more saws are arranged and operated to facilitate the feeding.

SEWING MACHINE.—L. H. Cobbs, Montgomery, Ala.—The object of this invention is to provide improvements in the construction of the Grover & Baker sewing machine, whereby the "lost motion" due to the wear of the crank connection with the needle arm, also the lost motion of the operating device for the vertical shaft of the curved needle may be avoided.

BENDING MACHINE.—D. G. Morris, Catasauqua, Pa.—This invention consists of a strong stand, having upon one side a pair of vertical grooves, a fixed former, and a bending lever and anti-friction wheel.

GUN LOCK.—William Dashner, Point Pleasant, West Va.—This invention consists in arranging a recessed projection on the interior of the rear end of the lock plate, for inclosing the tumbler dog and dog spring, and in the arrangement of a single or straight hammer spring on the outside of the plate, attached to the said plate in a peculiar manner, and to the hammer, a flat projection being formed on one side at the end to be secured, which passes through a corresponding slot, or mortise, in the front end of the lock plate, and is secured at the inside by a pin. A thin flat plate is arranged on the recessed inner projection, inclosing the tumbler and tumbler spring, to protect them from dust. The whole arrangement is exceedingly simple, and the entire lock is composed of very few and cheaply-constructed parts. It is also adapted for great efficiency in operation. For the terms on which the entire patent will be sold, or license to manufacture under said patent, address the patentee as above.

GRAIN BINDER.—Wm. Lottridge, Charles City, Iowa.—This invention relates to improvements in grain-binding machines, the object of which is to provide a machine capable of binding the sheaves with bands of straw, to be made and placed in position by the attendant. The arrangement of the machine is such that the grain is delivered upon a raking device attached to the side thereof, which conveys the grain in gavels in a lateral direction up an incline and delivers it into a trough, across which a band has previously been placed by the operator, with the ends to be tied around the sheaf in the notched or grooved ends of a pair of curved compressing jaws which move up from each side and condense the sheaf between them, and present the said ends of the band to a twister which twists the ends together, and from which the twisted end of the band is taken and tucked between the band and the sheaf by a tucker, in a manner similar to that practiced when bound by hand. After the tucking is accomplished, a discharger, actuated by a spring, strikes the sheaf at the end and drives it out of the trough.

BOBBINS FOR SEWING-MACHINE SHUTTLES.—R. S. Mershon, Zanesville, Ohio.—This invention consists in constructing a tubular bobbin, having one fixed and one movable pivot, or journal, or both journals or pivots may be movable; said pivots being operated or forced outward to maintain the bobbin in its place in the shuttle, by a spiral spring inclosed within the tube of the bobbin, and arranged to bear against the inner ends.

BREECH-LOADING FIREARM.—John D. Blaker, Newtown, Pa.—This invention relates to improvements in breech-loading firearms, having for its object to provide an improved arrangement of catch spring and detaching lever for holding and disconnecting the barrel, which is hinge-jointed, and swings downward for resisting the charge.

LEATHER-ROLLING MACHINE.—C. W. Monson, Upton, Iowa.—This invention consists in an arrangement of a part of smooth metallic rollers in a frame so that one may be caused to pass against the other or the leather between them, by the action of a foot-treddle while the other is turned by a hand-crank.

VISE.—Ira Coggswell, Jr., La Salle, Ill.—This invention relates to improvements in bench vises, designed to provide for conveniently adjusting the holding jaws to any required position for holding the work to advantage.

SEWING MACHINE TABLE AND COVER.—Thomas E. Hunt, Lafayette, Ind.—This invention relates to a new sewing machine table and cover, so constructed that the cover when swung open will be out of the way of the table, and that the latter will be enlarged when not covered.

WATER-TIGHT HOSE.—C. H. Proessdorf and E. Bauch, Boston Highland, Mass.—This invention relates to a new compound for making woven hose or piping water-tight, so that it may be used to the same advantage as rubber and leather hose.

VELOCIPEDE.—C. B. Guy, Postville, Iowa.—This invention relates to a new three-wheeled velocipede, adapted to two or more persons, and operated by the hands of the driver.

EMBROIDERING ATTACHMENT TO SEWING MACHINES.—Israel M. Rose, West Hampton, N. Y.—This invention relates to a new device which may be attached to any kind of sewing machine, and which will produce an embroidery stitch of very fine and ornamental appearance.

HORSESHOE.—P. C. Johnson, Central City, Colorado Territory.—This invention relates to a new manner of constructing the calks of horseshoes, so that they can be readily fastened and removed. The object of the invention is to provide a horseshoe which can always remain on the hoof, and which may easily receive new calks when the old ones are worn, or when in winter sharper toes have to be attached.

COMBINATION FISH BAR AND RAILROAD CHAIR.—Thos. J. Adams, Portsmouth, Ohio.—This invention relates to a new mode of securing the joints of railroad rails in a strong, durable, and economical manner, and increasing the bearing surface or base of the same on the sleeper to any desired extent.

MILK COOLER.—Jacob Dingee, Downington, Pa.—This invention relates to a new milk cooler, which is so arranged that the steam produced during the cooling process will be allowed to escape, and that the process itself will be rapid and thorough.

PIANOFORTE.—Charles A. Peterson, New York city.—This invention relates to a new manner of adjusting the chords in pianofortes by a novel arrangement of agraffes and a new substitute for the ordinary bridge.

HOISTING JACK.—W. A. Bowyer, Helen Furnace, Pa.—This invention relates to a new hoisting jack, which can be used to aid in loading timber upon wagons and for elevating other articles, and also for a wagon jack.

WASHING MACHINE.—Jonas Tramblie, Sanwich, Ill.—The object of this invention is to provide for public use an improved washing machine which shall be simple in construction, cheap, durable, easily cleansed and dried, and convenient of operation.

COMBINATION FURNACE.—J. Dwight Kellogg, Jr., Northampton, Mass.—This invention is intended to serve as a substitute for the ordinary cooking stove, in warm weather, being adapted for use either indoors or out of doors, and costing little, either to manufacture or operate, as the heat is economized to a degree that renders an unusually small amount of fuel necessary.

MEASURING DEVICE FOR SEEDING MACHINES.—H. B. Quick, Horicon, Wis.—The object of this invention is to produce for public use a new and improved device for effecting the escape of the seed from the seed box in a uniform and certain manner, such device being so adjustable that the quantity of seed sown shall be entirely under the control of the attendant, who can vary it at pleasure.

FORCE PUMP.—Luke L. Kellogg, Leon Center, N.Y.—This invention relates to a double-acting pump, provided with two buckets, moving simultaneously in opposite directions, and it consists in moving each bucket in one direction through a passage for the purpose of allowing water to pass through it, and then moving it in exactly the contrary direction through the same passage, for the purpose of forcing the water out of it.

COMBINATION PLOW.—B. F. McCarty, J. W. and R. J. Orr, Florence, Ga.—The object of this invention is to construct a simple, cheap, convenient, and durable plow, which can readily be adjusted to operate, either as a single plow, a double cultivating plow, or a covering plow; and the shares of which, when operating as a plow or cultivator, can be adjusted to cut the furrows anywhere from four to twelve or more inches apart.

CHURN.—W. L. Gordon, Dalton, Ga.—This invention consists in placing within a churn a vertical shaft, having on its lower end the dasher, and at its upper extremity a horizontal balance wheel, and there being, between the cover of the churn and the balance wheel, a cross head sliding on said shaft, which cross head is joined, by means of connecting rods, with the free end of a treadle, and is also, joined, by means of cords proceeding from its extremities, with the head of the shaft, all in such manner that, when the cords have once been wound around the shaft by hand rotation, and the free end of the treadle raised, then by exerting the treadle, a continuous rotation of the vertical shaft may be produced.

COMBINED CORN PLANTER AND CULTIVATOR.—Aaron G. Aiken, Somerton, Ohio.—The object of this invention is to provide for public use, in connection with corn planters, an improved device for raising and lowering the plows, rollers, etc., together with an improved feed regulator, and an improvement in the construction of the covering device; the whole being so constructed and arranged as to adapt it for convenient use, either as a cultivator or corn planter.

ATTACHING BELLS TO STRAPS.—Dwight M. Welch, Middle Haddam, Conn.—The method of attaching bells, heretofore employed, has been to pass their shank or stem through the strap end, fasten it there by a piece of wire, or species of forelock, passing through a hole in the end of the shank, on the back side of the strap. This left that side of the strap rough, so that it had to be covered to prevent its lacerating the horse's flesh, and to keep the bells from becoming detached, and make the whole device neat in appearance.

CORSET SPRINGS.—Mrs. Frances Lee Barnes, New York city.—This invention relates to a certain improvement in corset springs, whereby the same are made stronger and more durable in places where they now most easily break.

POLICE NIPPERS.—W. Gray Phillips, Brooklyn, N. Y.—This invention has for its object to furnish a neat, simple, and convenient instrument for use by the police in securing prisoners when they are taking them to the station house, and which shall be so constructed that it can be readily and quickly applied to the wrist of the prisoner, and when applied will enable him to be securely held.

WIND MILL.—C. S. Jenkins, Landsdale, Pa.—This invention has for its object to improve the construction of wind mills, so as to make them more convenient in use, more effective in operation, and more under the control of the operator than when constructed in the ordinary manner.

GRAIN BINDER.—N. F. Gilman, Rochester, Minn.—This invention has for its object to furnish an improvement in the method of binding grain as it is cut by a reaper, by means of an apparatus which shall be simpler than those usually applied, requiring a machinery less complex, and consequently less liable to get out of order from the roughness of the grain field.

KEY RING AND CHECK.—Charles A. Wentworth, Boston, Mass.—This invention has for its object to furnish an improved key ring, which shall be so constructed and arranged as to be securely locked and yet allow the keys to be conveniently put on and taken off, and which will allow the owner's name and address to be conveniently engraved or stamped upon it.

CUTTER BAR FOR MOWERS AND REAPERS.—B. Johnson, Carrollton, Ohio, and W. Johnson, Hanover, Ohio.—This invention has for its object to to improve the construction of the cutter bars of reaping and mowing machines, so as to make them cut more freely, run easier, and be less liable to become choked or clogged than when constructed in the ordinary manner, and which will allow the cutters to be conveniently dressed or sharpened when desired.

BEEHIVE.—Samuel B. Cranford, Upper Marlborough, Md.—This invention has for its object to improve the construction of beehives, so as to make them more convenient in use.

HAND PLOW.—William Gowen, Bartlett, Tenn.—This invention has for its object to furnish a simple and convenient hand plow or cultivator, designed especially for garden use, in putting in the seeds and cultivating the plants.

LINK ATTACHMENT FOR BRAKE BLOCKS.—Robert Humphrey, Albany, N. Y.—This invention has for its object to furnish an improved means for connecting the brake block to the frame of the car truck, which shall be strong, simple, and durable, and not liable to become accidentally detached.

COMBINED GANG PLOW AND DITCHING MACHINE.—Wilson Crawford, Streator, Ill.—This invention has for its object to furnish a simple and convenient machine, which shall be so constructed and arranged that it may be readily adjusted for use as a ditching machine or as a gang plow, as may be desired, doing its work well and thoroughly in either capacity.

WATER FENCE.—W. C. Barber, Van Wert, Ga.—This invention has for its object to furnish an improved fence for streams, and other places exposed to high water and freshets, which shall be so constructed and arranged as to open and allow the water and drift wood to pass through, and which shall at the same time be strong, simple in construction, and durable.

CULTIVATOR.—Nathan Butler, Otterville, Mo.—This invention has for its object to furnish an improved cultivator, which shall be simple in construction and convenient in operation, being so constructed and arranged that the plows may be readily adjusted to run at a greater or less depth in the ground, and that the plows may be easily raised away from the ground when desired by a simple movement of the driver's seat.

TELESCOPIC PIANO HINGE.—Amos S. Blake, Waterbury, Conn.—This invention has for its object to furnish an improved hinge for pianos, melodeons, organs, and other purposes, which shall be simple in construction, effective in operation, and at the same time so constructed and arranged as to leave the surface of the wood work to which it is attached entirely smooth, for convenience in finishing and polishing said wood work and in using the instrument.

PLOW CLEVIS.—W. W. Atteberry, Chesterfield, Ill.—This invention has for its object to furnish an improved adjustable clevis for attaching two or more horses to a plow, and which shall be so constructed and arranged that it may be readily adjusted to cause the plow to cut a wide or narrow furrow as may be desired.

GAS OIL.—John Butler, New York city.—This invention has for its object to furnish an improved heavy gravity compound oil with crude resin, and which shall be particularly adapted to the manufacture of rich gas for lighting small towns, public buildings, dwellings, etc.

EXPANDING DOUBLE SHOVEL PLOW.—Edward Wiard, Louisville, Ky.—This invention has for its object to furnish an improved double shovel plow, which shall be so constructed and arranged that the shovels may be adjusted to work at any desired distance apart, or at any desired pitch, as the circumstances of the case may render desirable.

WHEEL.—Thomas Ryan, Scott Bar, Cal.—This invention relates to a new and useful improvement in making wheels of carriages, and all descriptions of vehicles, and all descriptions of spoked wheels, whereby they are made more durable than wheels constructed in the ordinary manner.

CAN OPENER.—John A. Wells, Holly Springs, Miss.—This invention relates to a new and improved machine for opening tin cans, such cans as are used for containing and preserving (air tight) oysters, and various kinds of fruits, vegetables, meats, and extracts of various kinds.

LOOM.—Wm. Townsend, Seneca Falls, N. Y.—This invention relates to an improvement in looms, for weaving fancy cassimeres, and other goods, having particular reference to the method of operating the harnesses or heddles of the looms.

LOOM.—George H. Holmes, New Brunswick, N. J.—This invention relates to a new and useful improvement in looms for weaving cloth, having particular reference to the "take up" of the cloth.

WEATHER STRIP.—John Shaw, Clayton, Del.—This invention relates to a new and improved arrangement for preventing the entrance of wind and water under outside doors.

OPERATING NOZZLE EXHAUST VALVES.—A. Onslow, Jersey City, N. J.—This invention relates to a new and useful improvement in operating a valve on the exhaust nozzle in the smoke stack of a steam boiler.

CAB AND CRADLE.—George H. Henkel, Hartford City, Ind.—This invention relates to a new and improved arrangement, whereby a child's cab is converted into a cradle, and *vice versa*.

CHIMNEY COWL.—D. C. Battey and Carl L. Svensson, Topeka, Kas.—This invention relates to a new and useful improvement in cowls, whereby the draft is greatly increased.

STAIR ROD.—George W. Rogers, New York city.—The object of this invention is to produce cheap and durable stair rods, which will securely hold stair carpets in place and which will not require as frequent cleaning as the metallic rods now in use; also to provide a cheap and reliable fastening.

CORSET FASTENING.—Mrs. Marie T. Smith, New York city.—This invention relates to a new corset fastening or clasp, which is so arranged that the buttons or knobs formed thereon will not have to be passed through apertures of the fabric.

Official List of Patents.

Issued by the United States Patent Office.

FOR THE WEEK ENDING AUG. 10, 1869.

Reported Officially for the Scientific American.

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93,393.—RAILWAY RAIL SPLICE AND CHAIR.—T. J. Adams, Portsmouth, Ohio.
93,394.—MACHINE FOR MENDING STOCKINGS.—Benj. Arnold, East Greenwich, R. I.
93,395.—BEEHIVE.—Thomas Atkinson, Memphis, Tenn.
93,396.—CLEVIS.—W. W. Atteberry, Chesterfield, Ill.
93,397.—FENCE.—D. B. Ayres, Brooklyn, Mich.
93,398.—FLOOD FENCE.—W. C. Barber, Van Wert, Ga.
93,399.—CORSET STEELS.—F. L. Barnes, for herself, and as executrix of the estate of S. H. Barnes, deceased, New York city.
93,400.—CHIMNEY COWL.—D. C. Battey and C. L. Svensson, Topeka, Kas.
93,401.—DITCHING MACHINE.—Spencer Bentley, Green Oak, Mich.
93,402.—TELESCOPIC QUADRANT HINGE.—A. S. Blake, Waterbury, Conn.
93,403.—BREECH-LOADING FIREARM.—J. D. Blaker, Newtown, Pa.
93,404.—COUPLING FOR CARRIAGES.—Albert Booth (assignor to A. Booth, Son & Co.), Springfield, Ill.
93,405.—LIFTING JACK.—W. A. Bowyer, Helen Furnace, Pa.
93,406.—MANUFACTURE OF IRON.—E. Brady, Philadelphia, Pa.
93,407.—RAILWAY CAR COUPLING.—H. F. Breneman, Rapho township, assignor to himself and M. L. Greider, Lancaster county, Pa.
93,408.—SHUTTER WORKER.—F. E. Brown, Springville, Iowa.
93,409.—RULING MACHINE.—J. H. Bruce, Nashville, Tenn.
93,410.—INSULATOR FOR LIGHTNING RODS.—John Burnham, Batavia, Ill.
93,411.—COMPOUND OIL FOR PRODUCING GAS.—John Butler, New York city.
93,412.—CULTIVATOR.—Nathan Butler (assignor to himself and D. S. Butler), Otterville, Mo.
93,413.—MODE OF MAKING CORUNDUM WHEELS.—A. W. Calder, San Francisco, Cal.
93,414.—STEAM ENGINE.—W. C. Champlin, Allegeny City, Pa. Antedated Aug. 3, 1869.
93,415.—SEWING MACHINE.—L. H. Cobbs, Montgomery, Ala.
93,416.—VISE.—Ira Coggswell, Jr., La Salle, Ill.
93,417.—SAW MILL.—H. W. Conkling, Tecumseh, Mich.
93,418.—BEEHIVE.—S. B. Cranford, Upper Marlborough, Md.
93,419.—DITCHING MACHINE.—Wilson Crawford, Streater, Ill.
93,420.—GUN LOCK.—William Dashner, Point Pleasant, West Va.
93,421.—SADIRON POLISHER AND GLOSSER.—J. D. Davies, East New York, N. Y.
93,422.—PRINTERS' GALLEY.—Alexander De Puy, New York city.
93,423.—HAY ELEVATOR.—Wm. Derr, Tiffin, Ohio.
93,424.—MILK COOLER.—Jacob Dingee, Downington, Pa.
93,425.—SASH LOCK.—Samuel Easter, Charlestown, Mass.
93,426.—COMPOSING STICK.—John M. Eaton, Charlestown, Mass.
93,427.—COOKING STOVE.—John Fleming, Erie, Pa.
93,428.—SPURS FOR EXCELSIOR MACHINES.—J. A. Folsom, South Bend, Ind.
93,429.—FLASK FOR VULCANIZING RUBBER PLATES FOR SETTING TEETH.—C. G. French, Springfield, Ill.
93,430.—PLOW.—J. W. Gilliam, Elkton, Ky.
93,431.—HAND PLOW.—Wm. Gowen, Bartlett, Tenn.
93,432.—POCKET BOX FOR PERCUSSION CAPS, ETC.—Georges Gros, Bordeaux, France.
93,433.—VELOCIPEDE.—C. B. Guy, Postville, Iowa.
93,434.—SEED AND MANURE DROPPER.—J. G. Ham, Newnan, Ga.
93,435.—PORTABLE GASOMETER.—J. H. Hayward, New York city.
93,436.—FINGER GUARD FOR HOLDING HOT CORN.—Henry Hebbard, New York city.
93,437.—CAB AND CRADLE.—Geo. H. Henkel, Hartford City, Ind.
93,438.—HORSE POWER.—John Heuermann, Davenport, Iowa.
93,439.—HORSE HAY FORK.—Newell Hinman, Sparta, Mich.
93,440.—BUCKLE.—J. P. Hisley, Syracuse, N. Y.
93,441.—TAKE-UP FOR LOOMS.—G. H. Holmes, New Brunswick, N. J.
93,442.—LAMP BURNER.—Julius Hubbard, Montgomery, Ohio.
93,443.—RAILWAY BRAKE BLOCK.—Robert Humphrey (assignor to himself and R. C. Blackall), Albany, N. Y.
93,444.—SEWING MACHINE TABLE.—T. E. Hunt, La Fayette, Ind.
93,445.—RECLINING CHAIR.—Anthony Iske, Lancaster, Pa.
93,446.—WINDMILL.—C. S. Jenkins, Landsdale, Pa.
93,447.—HORSESHOE.—P. C. Johnson, Central City, Colorado Territory.
93,448.—CUTTER BAR FOR HARVESTERS.—Benjamin Johnson, Carrollton, and Wm. Johnson, Hanover, Ohio.
93,449.—MACHINE FOR GRADUATING CARPENTERS' SQUARES.—H. K. Jones, Hartford, assignor to the Hart Manufacturing Company, Kensington, Conn.
93,450.—GRAIN SEPARATOR AND CLOVER-CLEANING MACHINE.—E. L. Kelly, Reading, Mich.
93,451.—APPARATUS FOR DRILLING METAL.—J. A. Kirkpatrick and G. W. Hornby, Evansville, Ind.
93,452.—APPARATUS FOR UTILIZING WELLS AS REFRIGERATORS.—J. J. Kiser, Sulphur Springs, Ind.
93,453.—CANE AND STUBBLE SHAVER.—P. G. Kleinpeter, Plaquemine, La.
93,454.—VISE.—James Larkin, Detroit, Mich.
93,455.—CORN SHELLER.—W. D. Leavitt, New Orleans, La.
93,456.—CLOTHES PIN.—J. E. Lines (assignor to himself and J. W. Smith), Bryan, Ohio.
93,457.—BUNG.—Wm. Long, West Troy, and J. Garand, Troy, N. Y.
93,458.—GRAIN BINDER.—William Lottridge, Charles City, Iowa.
93,459.—TENSION DEVICE FOR SEWING MACHINE.—T. A Macaulay, Northampton, Mass.
93,460.—NEEDLE-HOLDING BLOCK FOR SEWING MACHINES.—T. A. Macaulay, Northampton, Mass.
93,461.—BELL-ROPE SUPPORTER.—W. C. Marshall, Hartford, Conn.
93,462.—CHURN.—James McElroy, Allegeny City, Pa.
93,463.—BOBBIN FOR SEWING MACHINE SHUTTLES.—R. S. Mershon, Zanesville, Ohio.
93,464.—TRUCK PLOW.—M. Michelson, Ashland Mills, Oregon.
93,465.—LEATHER-ROLLING MACHINE.—C. W. Monson, Upton, Iowa.
93,466.—CARRIAGE POLE AND SHAFTS COMBINED.—Augustus Moore and John Aylwerd, San José Mission, Cal.
93,467.—MACHINE FOR BENDING CAR HOOKS.—D. G. Morris Catasauqua, Pa.
93,468.—COMBINED FURNACE AND STEAM GENERATOR.—Franz Mörth, Vienna, Austria.
93,469.—BRAKE FOR MACHINERY.—R. D. Napier, Birkenhead, England.
93,470.—EXHAUST-NOZZLE-VALVE DEVICE.—A. Onslow, Jersey city, N. J.
93,471.—CHURN DASHER.—D. K. Overhiser, Williamsport, Pa.
93,472.—WINDMILL.—P. C. Perkins, Mishawaka, Ind.
93,473.—PIANO-FORTE.—C. A. Peterson, New York City.
93,474.—POLICE NIPPER.—W. G. Phillips, Brooklyn, N. Y.
93,475.—NEWSPAPER FILE.—L. C. Prindle, Chicago, Ill.
93,476.—WOVEN HOSE FOR WATER, ETC.—C. H. Procssdorf and E. Hauch, Boston Highland, Mass.
93,477.—PROCESS OF PREPARING ICELAND AND IRISH MOSS for use in food.—W. J. Rand, Brooklyn, E. D., N. Y.
93,478.—MANUFACTURE FROM ICELAND MOSS AND CARRAgeen.—W. J. Rand, Brooklyn, E. D., N. Y.
93,479.—STAIR ROD.—G. W. Rogers, New York City.
93,480.—EMBROIDERING ATTACHMENT FOR SEWING MAchine.—I. M. Rose, West Hampton, N. Y.
93,481.—METALLIC BUNG WITH AUTOMATIC VENT.—Augustus Ruoff, Detroit, Mich.
93,482.—ROOFING COMPOSITION.—S. I. Russell and J. H. Cole, Chicago, Ill.
93,483.—PROCESS FOR FORMING THE HUB AND SPOKES OF wrought-iron wheels.—Thomas Ryan, Scott Bar, Cal.
93,484.—CARRIAGE JACK.—J. F. Seaman, Cortlandville, N. Y.
93,485.—MECHANICAL MOVEMENT.—H. F. Shaw, West Roxbury, Mass.
93,486.—CLUTCH.—H. F. Shaw, West Roxbury, Mass. Antedated August 5, 1869.
93,487.—WEATHER STRIP.—John Shaw, Clayton, Del.
93,488.—CLOTHES WRINGER.—Gilbert Smith, Highland Falls, N. Y.
93,489.—CORSET FASTENING.—M. T. Smith, New York City.
93,490.—HOISTING MACHINE.—W. M. Smith, Augusta, Ga.
93,491.—MANGLE.—Nicolous Soderstrom, Chicago, Ill.
93,492.—TURNING LATHE.—I. H. Spencer, North Providence, R. I., assignor to A. N. Bullock, A. C. Bullock, and E. R. Clark.
93,493.—STALK CUTTER.—Lucas Stadler, Bowen, and W. H. Staats, and A. C. Schwanke, La Prairie, Ill.
93,494.—STEAM CULTIVATOR.—A. J. Stevens, San Francisco, Cal.
93,495.—SLED BRAKE.—J. B. Storey and I. N. Ross, Butler, Pa
93,496.—SHINGLE MACHINE.—D. B. Strong and William Buskirk, Winchester, Mo.
93,497.—PEGGING JACK.—W. H. Sweetland, Marblehead, Mass.
93,498.—TANNING COMPOSITION.—N. A. Thornton, Conikee, Ala., assignor to himself and M. L. Thornton, Lumpkin, Ga.
93,499.—TOILET PIN CASE.—T. R. Timby, Saratoga, N. Y.
93,500.—LOOM.—William Townsend, Seneca Falls, N. Y.
93,501.—PERMUTATION PADLOCK.—J. E. Treat, Oxford, Mich.
93,502.—EXTENSION LADDER.—C. G. Udell, Chicago, Ill.
93,503.—BIRD BATH.—T. W. Van Tassel, (assignor to himself and William Beaman), Washington, D. C.
93,504.—COMBINED KNOB LATCH AND LOCK.—J. H. Vickers, (assignor to Norwich Lock Company), Norwich, Conn.
93,505.—CAN OPENER.—J. A. Wells, Holly Springs, Miss.
93,506.—KEY RING AND CHECK.—C. A. Wentworth (assignor to A. C. Norcross), Boston, Mass.
93,507.—EXPANDING DOUBLE SHOVEL PLOW.—Edward Wiard (assignor to B. F. Avery), Louisville, Ky.
93,508.—CASKET HANDLE.—H. C. Wilcox (assignor to the Meriden Britannia Company), West Meriden, Conn.
93,509.—DEVICE FOR OPERATING COCKS OF STEAM CYLINders.—W. H. Woods, San Francisco, Cal.
93,510.—COMBINED CORN PLANTER AND CULTIVATOR.—A. G. Aikin, Somerton, Ohio.
93,511.—SEWING MACHINE.—J. F. Andrews, Lancaster, Pa.
93,512.—LIFTING JACK.—J. B. Ausbourne (assignor to himself and Hiram Mallory), Milwaukee, Wis. Antedated August 5, 1869.
93,513.—SPEED INDICATOR FOR SHIPS.—Armand Banare, Paris, France.
93,514.—IMPLEMENT FOR SLITTING AND JOINING RAGS FOR CARPETS.—John Beal, Port Gibson, N. Y.
93,515.—BASE-BURNING STOVE.—W. S. Bronson, Hartford, Conn.
93,516.—BASE-BURNING COOK-STOVE.—W. S. Bronson, Hartford, Conn.
93,517.—STOVE ATTACHMENT.—M. E. Capen, Aurora, Ill. Antedated August 3, 1869.
93,518.—STUFFING BOX.—W. H. T. Clark, San Francisco Cal.
93,519.—RABBETING MACHINE.—J. J. Clark and Thomas Clark, Elgin, Ill.
93,520.—HORSE HAY FORK.—Francis Cramer, Chess Springs Pa.
93,521.—MONKEY-WRENCH.—Loring Coes, Worcester Mass.
93,522.—NAIL EXTRACTOR.—I. F. Davis, Rockford, Ill.
93,523.—DISTILLING ALCOHOLIC SPIRITS AND LIQUORS.—Jonathan Dennis, Jr., Washington, D. C. Antedated Feb., 1863.
93,524.—WAGON BRAKE.—Charles Dold. Mason, Ohio.
93,525.—MATCH MACHINE.—W. B. Eltonhead, Philadelphia, Pa.
93,526.—TREATING CLAY AND DRYING BRICKS.—Jeremiah Fisher, Reading, Pa.
93,527.—ADDRESSING MACHINE.—George Gibbons, Meriden, Conn.
93,528.—CORSET.—T. S. Gilbert (assignor to himself and G. F. Bushnell, Birmingham, Conn.
93,529.—SEEDING MACHINE.—M. L. Gorham, Rockford, Ill.
93,530.—CULTIVATOR.—E. S. Gregory, Lockport, N. Y.
93,531.—PASSENGER AND STATION REGISTER.—J. C. Hackett, Sacramento, Cal.
93,532.—DEVICE FOR ATTACHING TRACES TO VEHICLES.—I. C. Ham, Charlestown, Mass.
93,533.—ANIMAL TRAP.—George Haneline, Akron, Ohio.
93,534.—MORTISING CHISEL.—Carl Hinz, San Francisco, Cal.
93,535.—LANTERN.—John Hughes, Buchanan, Pa.
93,536.—COPYING PRESS.—J. M. Keep, New York city.
93,537.—PUMP.—Luke Kellogg, Leon Centre, N. Y.
93,538.—PORTABLE COOKING FURNACE.—J. D. Kellogg, Jr., Northampton, Mass.
93,539.—METHOD OF WEAVING GALLOON.—Jacob Kemper, Philadelphia, Pa.
93,540.—BASTER-GUIDE FOR SEWING MACHINES.—J. T. Jones, (assignor to the Singer Manufacturing Company), New York city.
93,541.—CAN OPENER.—G. C. Joyce, Baltimore, Md.
93,542.—SLATE FRAME.—Alicia Lynch and M. L. Moffat, Brooklyn, N. Y.
93,543.—COMBINATION PLOW.—B. F. McCarty, J. W. Orr, and R. J. Orr, Florence, Ga.
93,544.—SUBMARINE CLOTHING.—Clark S. Merriman, Afton, Iowa.
93,545.—METALLIC CARTRIDGE.—Isaac M. Millbank, Greenfield Hill, Conn.

93,546.—Metallic Cartridge.—Isaac M. Millbank, Greenfield Hill, Conn.
93,547.—Valve for Water Closet Pipes.—Geo. R. Moore, Philadelphia, Pa.
93,548.—Stump Extractor and Press Combined.—Nicholas V. Morelle and Lewis J. Morelle, Newark, Wis.
93,549.—Plow.—H. W. Neal (assignor to Jason McVay), Sidney, Ohio.
93,550.—Churn.—James L. Nelson, Lewisburg, W. Va.
93,551.—Clothes Dryer.—Theodore Oakley, Booneville, N. Y.
93,552.—Screw Plate.—A. W. Owen and James Barnes, East Canton, Pa.
93,553.—Sewing Machine.—Hiram Plummer, Brooklyn, N. Y., assignor to himself and William E. Doubleday and Company, New York city.
93,554.—Device for Regulating the Feed in Seeding Machines.—H. B. Quick (assignor to himself and Hiram Barber), Horicon, Wis.
93,555.—Packing Device.—William Riddle, 10 Larkhall Lane, England.
93,556.—Cabinet Bedstead.—Daniel T. Robinson, Boston, Mass., assignor to William B. Wickes, Sharon, Mass.
93,557.—Extension Dining Table.—Daniel T. Robinson, Boston, Mass., assignor to William B. Wickes, Sharon, Mass.
93,558.—Plow.—John Runyon, Marshall township, and Geo. Ingersoll, Marshall Mich.
93,559.—Grain Separator.—James F. Russell, Franklin, Ohio. Antedated August 5, 1869.
93,560.—Cutlery.—Wm. Sanderson, New York city.
93,561.—Double Faucets.—Edward Sauter, Hartford, Conn.
93,562.—Device for Holding Lids to Cups, etc.—Ph. I. Schopp, Louisville, Ky.
93,563.—Electrical Machine.—H. Julius Smith, Boston, Mass.
93,564.—Automatic Boiler Feeder.—Henry E. Stager, Milwaukee, Wis. Antedated July 31, 1869.
93,565.—Lamp Extinguisher.—Wm. H. Terpening and Clinton W. Terpening, Geneseo, Ill.
93,566.—Washing Machine.—Jonas Tramblie, Sandwich, Ill.
93,567.—Copying Press.—W. W. Underhill, Boston, Mass.
93,568.—Sleigh Bell.—Hiram Veazey, East Hampton, Conn.
93,569.—Sleigh-bell Fastening.—Hiram Veazey, East Hampton, Conn.
93,570.—Knee-clasp for Horses, etc.—Job A. Warden, Minnesota Junction, Wis.
93,571.—Apparatus for Holding Hat Blocks.—James White, Cleveland, Ohio.
93,572.—Revolving Firearm.—Rollin White, Lowell, Mass.
93,573.—Hoop Skirt.—John Whitehead and John McKeever, New York city.
93,574.—Apple Parer and Slicer.—David H. Whittemore, Worcester, Mass.
93,575.—Revolving Ice Pitcher and Coffee-pot.—John P. Adams, New York city, assignor to himself, Henry S. Chandler, and Marcus Ormsbee, Brooklyn, N. Y.
93,576.—Machine for Driving Posts.—Wm. Altick, Dayton, Ohio.
93,577.—Lantern.—Joshua E. Ambrose, Lombard, Ill.
93,578.—Piston Packing.—Joseph Anthony and Thomas B. Purves, Greenbush, N. Y.
93,579.—Hay Elevator.—T. H. Arnold, Troy, Pa.
93,580.—Tool Holder.—Joseph R. Bailey (assignor to himself and Selden A. Bailey), Woonsocket, R. I.
93,581.—Hay Loader.—Joseph R. Bailey, Woonsocket, R. I., assignor to himself, Selden F. Bailey, and Orin Freeman.
93,582.—Milk Separator.—Anna E. Baldwin, Newark, N. J.
93,583.—Milk Cooler.—Anna E. Baldwin, Newark, N. J.
93,584.—Railway Draw Bar.—David S. Beals, Adrian, Mich.
93,585.—Ax.—Jacob H. Beidler, Adrian, Mich.
93,586.—Grain Separator.—Charles A. Bikle (assignor to himself and John W. Garner), Hagarstown, Md.
93,587.—Coffee-pot.—E. Blunt, Jr., New York city.
93,588.—Sewing Machine.—Joseph Bond, Jr., Newark, N. J.
93,589.—Miter Box.—Seth D. Bowker, Kansas City, Mo.
93,590.—Grapple.—J. H. Brinton, Thornbury, Pa. Antedated August 6, 1869.
93,591.—Glass Mold.—Homer Brooke, New York city.
93,592.—Buckle or Slide for Hoop Skirt Bands.—Heman P. Brooks, Waterbury, Conn.
93,593.—Three-horse Equalizer.—Willard P. Brooks, Bloomington, Ill.
93,594.—Optical Instrument.—O. B. Brown, Malden, Mass.
93,595.—Machine for Disintegrating, Dispersing, and Mixing Fertilizers and other Materials.—Thomas Carr, Bristol, Great Britain. Patented in England, October 22, 1868.
93,596.—Device for Applying Steam to Wool, etc.—Wm. Carter, Columbus, Ind.
93,597.—Injector for Insect Powders.—Charles Chinnock, Brooklyn, N. Y.
93,598.—Mechanical Movement.—Thomas J. Clark and Geo. M. Clark, Higganum, Conn.
93,599.—Fuel-reservoir of Base-burning Stove.—Thos. J. Coulston, Springville, assignor to E. S. Shantz and Joseph Johnson, Royer's Ford, Pa. Antedated May 25, 1869.
93,600.—Hinge for Stove Lid.—Thomas J. Coulston, Springville, assignor to E. S. Shantz and Joseph Johnson, Royer's Ford, Pa. Antedated May 25, 1869.
93,601.—Refrigerator.—E. J. Creasy, Philadelphia, Pa.
93,602.—Railroad Lamp.—James M. A. Dew (assignor to himself and Oswell A. Bogen), Chicago, Ill. Antedated April 6, 1869.
93,603.—Printers' Quoin.—Daniel Dorrity, Pont-Audemer, France, assignor to Farrell Dorrity, New York city.
93,604.—Friction Clutch.—George D. Emerson, Calumet, Mich.
93,605.—Corn Cultivator.—Wm. Emmons and David A. Wells, Sandwich, Ill.
93,606.—Enameling Wood and other Solid Materials with Hard Rubber.—Perry Finley, Memphis, Tenn.
93,607.—Deodorizing Compound.—Randall Fish, Washington D. C.
93,608.—Shuttle for Loom.—Charles H. Fiske, Lowell, Mass.
93,609.—Lightning Rod.—David A. Foot and Avery Chadwick, Winona, Minn.
93,610.—Submarine Rock-drilling Machine.—John G. Foster and George W. Townsend, Boston, Mass.
93,611.—Cultivator.—Daniel D. Franklin (assignor to himself and J. S. Underwood). Flora, Ill.
93,612.—Bending Machine.—Henry S. Golightly and Chas S. Twitchell (assignor to the New Haven Folding Chair Company), New Haven, Conn.
93,613.—Machine for Making Bullets.—J. E. Granniss, New York city.
93,614.—Cleaver.—Chas. Hammond, Philadelphia, Pa.
93,615.—Sewing Machine.—Anna Hancock, New York city.
93,616.—Hat.—Henry Hayward, New York city.
93,617.—Material for Lubricating Wool and other Animal Fibers.—George Felix Henry, Ivar Axel Ferdinand Bang, Francois Roch Charles Monestier, and Jean Pierre Albin Figuier, Paris, France.
93,618.—Gang Plow.—Philipp Herbert, St. Louis, Mo.
93,619.—Measuring and Folding Cloth.—L. Hillman, Newton, N. J.
93,620.—Clothes Rack and Dryer.—Amos Hornor, Ross, Ind.
93,621.—Wagon.—C. C. Johnson, Springfield, Vt.
93,622.—Compound for Destroying Vermin in Cattle.—Frederick Kalteyer, San Antonio, Texas.
93,623.—Vulcanizing Rubber for Dental Plates, and for other Purposes.—Cyrus M. Kelsey, Mount Vernon, Ohio.
93,624.—Neckties.—Geo. Kennedy (assignor to himself and F. R. Harbaugh), Philadelphia, Pa.
93,625.—Electro-Magnetic Machine.—Jerome Kidder, New York city.
93,626.—Clothes Rack and Stand.—W. B. Kimball, Peterborough, N. H.
93,627.—Harvester.—I. Lancaster, Baltimore, Md.
93,628.—Cutter Head.—Michael Lehman, Cincinnati, Ohio.
93,629.—Process of Preparing Coke from Colorado and other Coals.—W. J. Lynd, Golden City, Colorado Territory.
93,630.—Platform Scale.—Wm. Maguire (assignor to himself and F. B. Loney), Baltimore, Md.
93,631.—Planing Teeth for Saws.—Gottleib Maulick (assignor to himself and Thomas P. Marshall), Trenton, N. J. Antedated Aug. 6, 1869.
93,632.—Bed Bottom.—Alexander McBride and W. P. McBride, Lowell, Mich.
93,633.—Spindle and Bobbin Tubes for Spinning Machine.—Alexander McFarland and C. W. Pack, Paterson, N. J.
93,634.—Side Saddle.—J. C. Miller, Danville, Ky.
93,635.—Washing Machine.—L. F. Muhlinghaus, Brooklyn, E. D., N. Y.
93,636.—Rolling Cutter for Plows.—Robert Newton, Jerseyville, Ill.
93,637.—Mechanism for Operating Shuttle Boxes of Looms.—Archibald Nimmo (assignor to himself and Thomas Moran), Philadelphia, Pa.
93,638.—Bridge.—C. H. Parker, Boston, Mass.
93,639.—Elastic Trace Connection.—Hugh Quinn, Charlestown, Mass.
93,640.—Mode of Desulphurizing Auriferous Pyrites and other Sulphuret Ores.—Julio H. Rae and Thomas T. Davis, Syracuse, N. Y.
93,641.—Harvester.—C. A. Reed, Madison, and J. M. Campbell, Beaver Dam, Wis.
93,642.—Extension Ladder.—Artemas Rogers, Pancsville, Ill.
93,643.—Kiln for Roasting Ores.—J. M. Rohrer and J. H. Bassler, Pine Grove, Pa.
93,644.—Till Lock.—J. P. Schmucker, Lattasburg, Ohio. Antedated Aug. 4, 1869.
93,645.—Process and Apparatus for Extracting Oil from Vegetable and other Matters.—Thomas Sim, Baltimore, Md.
93,646.—Floor for Buildings.—H. M. Smith and W. C. Smith, New York city.
93,647.—Pianoforte Action.—Theodore Steinway, New York city.
93,648.—Saw Set.—N. B. Tyler, Warren, Ohio.
93,649.—Friction Brake for Cotton-lapping Machine.—Edward Van Winkle, Paterson, N. J.
93,650.—Elastic Pitman for Stone-channeling Machine.—G. J. Wardwell, Rutland, Vt., assignor to the Steam Stone Cutter Co., New York city.
93,651.—Cultivator.—H. J. Wattles, Rockford, Ill.
93,652.—Attaching Bells to Straps.—D. M. Welch, Middle Haddam, Conn.
93,653.—Revolving Fire-arm.—Rollin White, Lowell, Mass.
93,654.—Removable Calk for Horseshoes.—Edward Whitehead, Cincinnati, Ohio.
93,655.—Suspenders.—A. B. Wilcox, Lowell, Mass.
93,656.—Device for Adjusting and Buttoning Neckties.—Omar Wilson, Sandusky City, Ohio.
93,657.—Stop-cock Box for Water and Gas Mains.—O. F. Woodford (assignor to J. E. Miller), Chicago, Ill.
93,658.—Hydrant.—Michael Zwiebel, Pottsville, Pa.
93,659.—Composition Cement for Pavements.—Abraham McKeon, Rutherford Park, N. J.
93,660.—Railway Car Seat.—T. C. Theaker, Bridgeport, Ohio.

REISSUES.

64,102.—Auxiliary Air Chamber for Stoves, Heaters, and Furnaces.—Dated April 23, 1867; reissue 3,585, (dated Aug. 3, and omitted in the list of claims of that date).—Elizabeth Hawks, Troy, N. Y.
38,175.—Postoffice Post-marking and Canceling Hand-Stamp.—Dated April 14, 1863; reissue 1,748, dated Aug. 23, 1864; reissue 3,586 (dated Aug. 3, and omitted in the list of claims of that date).—M. P. Norton, Troy, N. Y.
77,269.—Fertilizer Attachment.—Dated April 28, 1868; reissue 3,587 (dated Aug. 3, and omitted in the list of claims of that date). C. C. Foster, Odessa, Del.
44,037.—Machine for Making Twist Drills.—Dated Aug. 30, 1864; reissue 3,588.—American Standard Tool Co., Newark, N. J., assignees, by mesne assignments, of A. R. Arnold.
56,525.—Cooking Stove.—Dated July 24, 1866; reissue 3,589.—Esek Bussey, Troy, N. Y.
63,223.—Carriage.—Dated March 26, 1867; reissue 3,590.—John Curtis, Cincinnati, Ohio.
67,749.—Packing for Deep Wells.—Dated Aug. 13, 1867; reissue 3,591.—E. F. Griffin, Chicago, Ill., administrator of the estate of A. D. Griffin, deceased.
88,721.—Wagon Brake.—Dated April 6, 1869; reissue 3,592.—August Kessberger, Springfield, Ill.
48,955.—Tobacco Press.—Dated July 25, 1865; reissue 3,593.—J. D. King, Toronto, Canada West.
38,003.—Mode of Purifying Cast Iron.—Dated March 24, 1863; reissue 3,594.—S. W. Kirk, Coatesville, Pa., and C. E. Stotsenburg, Wilmington, Del., assignees of S. W. Kirk.
34,984.—Coal-oil Lamp.—Dated April 15, 1862; reissue 2, 55, dated Feb. 4, 1868; reissue 3,595.—Holmes, Booth, & Haydens, Waterbury, Conn., assignees, by mesne assignments, of Joseph Ridge.

DESIGNS.

3,604.—Ornamenting Harness Trimmings.—Wm. Blum, Newark, N. J.
3,605.—Picture Frame.—Edward B. Bradley, New Haven, Conn.
3,606 to 3,608.—Door Escutcheon.—Wm. Gorman (assignor to the Russell & Erwin Manufacturing Co.), New Britain, Conn. Three Patents.
3,609.—Bridle Bit.—A. Hegeman, Jr., New York city.
3,610.—Frame of a School Desk.—Alfred Hutchinson, Philadelphia, Pa.
3,611.—Upright Drill.—F. A. Pratt (assignor to Pratt, Whitney & Co.), Hartford, Conn.

EXTENSION.

Straw Cutter.—D. C. Cummings, Smithville, N. J.—Letters Patent No. 13,385, dated Aug. 7, 1855.

Inventions Patented in England by Americans.

[Compiled from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

2,005.—Apparatus for Preparing Flax, Hemp, and other Fibers, and in Converting the same into Silver.—Henry Lawrence & Sons, New York city, and John Good, Brooklyn, N. Y. July 2, 1869.

2,053.—Apparatus for Removing Artificial Coatings from Metallic Surfaces.—B. H. Harmon, Clifton Springs, and P. H. Rose, Canandaigua, N. Y. July 7, 1869.

2,089.—Sofa Bedstead.—H. F. Hover, Philadelphia, Pa. July 10, 1869.

2,138.—Coiled Springs and Machinery for Making the Same.—Wm. Metcalf, Pittsburgh, Pa. July 15, 1869.

2,147.—Propelling Machinery for Canal Boats and other Vessels.—F. R. Pike, New York city. July 16, 1869.

2,160.—Electro-Magnetic Engine.—Louis Bastet, New York city. July 17, 1869.

2,175.—Transfer Engraving.—Robert Neale, Brooklyn, N. Y. July 19, 1869.

2,204.—Marlin Spike.—Calvin Torrey, Boston, Mass. July 21, 1869.

2,208.—Railroad Spring.—John W. Cochran, New York city. July 21, 1869.

2,212.—Extract from Hops.—Hugh Burgess, Royers Ford, Pa. July 21, 1869.

2,218.—Breech-Loading Firearm.—Geo. T. Abbey, Chicago, Ill. July 21, 1869.

2,242.—Harness Motion for Power Looms.—E. B. Bigelow, Boston, Mass. July 23, 1869.

2,276.—Water Measurer.—Girard Sickles and O. A. Farwell, Boston, Mass. July 27, 1869.

NEW PUBLICATIONS.

We are in receipt of the publishers advance sheets of a new work entitled "Our Home Physician," being a new and popular guide to the art of preserving health and treating disease, with plain advice for all the medical and surgical emergencies of the family. It treats of the structure and functions of the human body; the influence of occupation on health and longevity; the laws of inheritence; with new and original chapters on diet, stimulants and narcotics, air, sunlight, exercise, climate, electricity, and nervous diseases of modern times; and full directions for the care of the sick, and the management of infants and children; with a general description of recent medical discoveries and improvements; plain suggestions for the treatment of diseases adapted to the wants of the household, and for those who, like miners, sailors, planters, and dwellers in remote districts, are beyond the ready call of a physician. The discussion of these topics is based upon the most recent and the highest authorities in the several departments, and brought down to the latest dates. The author is George M. Beard, A.M., M.D., lecturer on nervous diseases in the University of New York; Member of the New York County Medical Society; one of the authors of "The Medical Use of Electricity," etc.

There are numerous illustrations, a specimen of which we this week copy in an article on the Restoration of Persons Apparently Dead from Drowning. We recommend the work to all who desire to obtain new and valuable information in regard to the preservation of health and the proper treatment of disease. It will shortly be published by E. B. Treat & Company, 654 Broadway, New York city.

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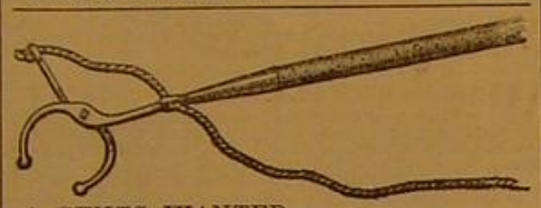

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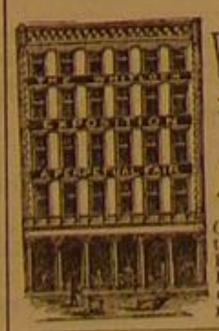

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Improvement in Car Trucks.

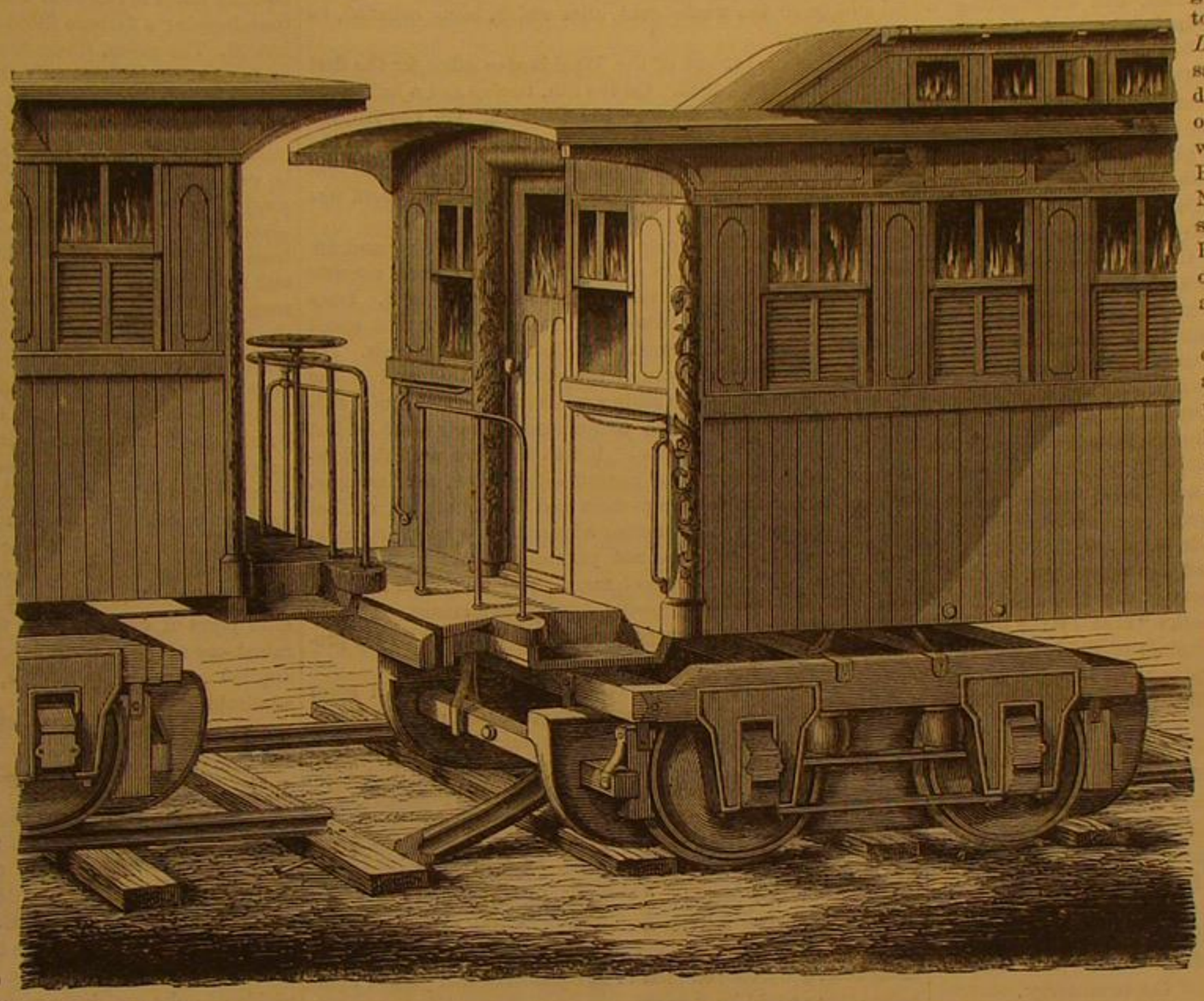
The improvement herewith illustrated is the invention of C. R. Morris, master mechanic of the Housatonic Railroad, and H. W. Franklin, superintendent of the same road, and is intended to obviate, so far as can be done by mechanical means, the principal cause of destruction and disaster consequent upon the breaking of a rail during the passage of a train, or the throwing off of the cars from the track by any other cause.

The inventor justly reasons that if the road-bed were perfectly smooth and hard, and lateral motion of a train could be prevented, there could no serious damage result to a train running off the track even at high speed. The sinking of the wheels into the earth, the bumping caused by the opposing ties, and the running down embankments, are the principal causes of the terrible consequences often resulting from accidents of this kind.

As making the road-bed hard and smooth is of course impracticable, the inventor has attempted to approximate the effect of such a way by attaching to the truck frame two stout runners, made either of heavy plank shod with metal, or entirely of metal, or of any material or combination of materials, which experiment may prove best for the purpose.

These runners are firmly fixed to the truck frame, and descend as nearly as practicable to a level with the face of the car wheels, having clearance, however, for passing over frogs, etc. The brakes act independently of the runners and are in no way connected with them.

It is obvious that, in case of the breaking of a rail in running off the track, these runners will receive at once the weight of the car and prevent all but a slight sinking of the wheels. At the same time they will, in conjunction with the ties, act as brakes to rapidly check the advance of the train, and also prevent lateral motion of the car, as they will more or less indent the ties and thus prevent the cramping of the truck. In case an axle should break while passing over a bridge, the inventors are confident a car would slide entirely across without serious damage, and without any accident to passengers.



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STEAM PIPES AND OTHER CAUSES OF FIRES IN MANUFACTURING ESTABLISHMENTS.

Among the most important causes of fires in manufacturing establishments, says the "Bulletin of the National Association of Wool Manufacturers," for July, is danger from steam pipes; the danger being greater because the steam or hot-water pipes being introduced as a measure of precaution against fires, liability from fire is not apprehended from that source. Steam and hot-water pipes are often suffered to remain in contact with wood-work, and frequently packed with charcoal or sawdust to prevent radiation. The following facts illustrate the danger of these practices:

The officers of the insurance companies charged with the examination of mills, remark upon the general prevalence of the impression that there is no danger of ignition from steam pipes. An insurance officer, visiting mills at Exeter, N. H., observed a steam pipe running through a partition, and in contact with the wood-work. The agent, although incredulous of danger, promised to cut out the wood around the pipes. A few days afterwards the wood was removed wherever in contact. In the course of the examination, timbers in contact with the pipe, at a distance of three hundred feet from the boiler, were found to have been on fire. The pieces which were shown to me were completely charred. My informant stated the following case to the agent, who incredulously inquired, "Did you ever know a case where steam pipes set wood on fire?"

"At the Oneco Mills, in Sterling, Conn., there being no steam-heating apparatus, a detached tubular boiler was placed in a building at some distance from the mill, to supply steam for heating and for running a donkey engine to assist the water wheel. A steam pipe two and a half inches in diameter, for conveying the steam to the mill, passed through the wall of the boiler house, then ran perpendicularly to the ground, and under ground into the mill. To prevent condensation of the steam, the pipe was inclosed in a tight box of wood filled with powdered charcoal. All worked well for ten days, when a fire took place in the horizontal inclosing box, near the boiler house—supposed to be from a spark from the boiler—then in the perpendicular portion of the inclosing box, and finally in the part under ground." The facts before stated as to the ignition of charcoal, show that spontaneous ignition was the almost inevitable result of this contact of charcoal with hot-air pipes. Where it is desired to prevent radiation from steam pipes and boilers, it would be well to adopt the plan recommended by Prof. Tyndall in his lectures on "Heat as a Mode of Motion," who observes that "there are cases where sawdust, chaff, or charcoal could not be used with safety (to prevent radiation from steam pipes), on account of their combustible nature. In such cases powdered gypsum may be used with advantage. In the solid crystalline state it is incomparably a worse conductor than silica, and it may be safely inferred that in the powdered state its imperviousness far transcends that of sand, each grain of which is a good conductor. A jacket of gypsum powder around a steam boiler would materially lessen its loss of heat."

Mr. Braidwood, whose vast experience gives great weight to his opinions, earnestly warns against the danger from steam and hot-water pipes. He says: "There appears to be some chemical action between heated iron and timber, by which heat is generated at a much lower temperature than is necessary to ignite timber under ordinary circumstances. No satisfactory explanation of this fact has yet been given, but there is abundant proof that such is the case. In heating by hot-water pipes, those hermetically sealed are by far the most dangerous, as the strength of the pipes to resist the pressure is the only limit of the heat to which the water, and of course the pipes, may be raised. In some cases a plug of metal which fuses at 400°, is put into the pipes, but the heat to which the plug is exposed will depend very much on where it is placed, as however great may be the heat of the exit pipe, the return pipe is comparatively cool. But even where the pipes are left open the heat of the water at the furnace is not necessarily at 212°. It is almost needless to say that 212° is the heat of boiling water under the pressure of one atmosphere only; but if the pipes are carried sixty or seventy feet high, the water in the furnace may be under the pressure of nearer three atmospheres, and therefore the heat will be proportionably increased. Fires from pipes for heating by hot water have been known to take place within twenty-four hours after first heating, and some after ten years of apparent safety."

Mr. Braidwood, in his testimony before a committee of the House of Lords, in 1846, stated that it was his belief that by long exposure to heat, not much exceeding that of boiling water, 212°, timber is brought into such a condition that it will fire without the application of a light. The time during which this process of desiccation goes on, is, he thinks, from eight to ten years. The writer in the *London Quarterly*, before quoted, says that Mercers' Hall, in London, built in 1853, was the victim of its hot-water pipes; the woodwork in the vaulted rooms of the British Museum, containing the Nineveh marbles, was fired in a similar manner, and the new Houses of Parliament have been on fire several times already from a similar cause.

The most cautious insurance companies, taking in view the absolute danger from steam pipes, unless most carefully fitted, and the common belief that there is no danger, which prevents the requisite care, regard the system of heating by steam pipes as ordinarily no safer than heating by anthracite stoves, or by burning wood in a box stove well fitted up—as the visible presence of the fire induces carefulness. Still the system of heating by steam is preferred when the pipes are well fitted, and all contact with combustible matter prevented. It is better that the boiler should be outside in a building erected for the purpose. When the pipes pass through a floor they should be surrounded with an iron plate or flange. The inner rim of the flange should be provided with points touching the pipes, so that a constant current of air should pass through.

The danger in heating by horizontal smoke flues, although they are rarely used in mills except for drying purposes, is greater than in the use of steam pipes. As the whole of the draft must pass through the fire, these flues, if not properly built, are dangerous through their whole course. This is observed in the market green-houses which formerly were generally heated by such flues. The author of "Practical Floriculture and Gardening for Profit," Mr. Peter Henderson, says: "Too great caution cannot be used in keeping wood-work away from the flue and chimney at the furnace end; and for fifteen feet of the hot end of the flue, wood should never be placed nearer than one foot. Do not listen to what your builders may say, as few of them have had experience in such matters; and whatever they may pretend, not one in a dozen knows more about what is dangerous from a fire than you do yourself." After mentioning several instances to show the necessity of the utmost caution in the use of this mode of heating, he remarks that, "Every winter there are hundreds of fires originating in green-houses by the wood-work taking fire from flues."

Although gas, if carefully laid on and properly used, is safer than any other light, it is important that much care should be exercised in the location of the jets. Gas-burners are dangerous when placed near a ceiling. Mr. Braidwood mentions an instance where a gas-light set fire to a ceiling twenty-eight inches and a half from it. The papers, as I am informed, have recently published a statement of a similar instance which occurred at Pittsfield, Mass. Mr. Eyre M. Shaw, superintendent of the London fire department, in 1862, and the successor of Mr. Braidwood, lays down the rule that "jets or movable gas brackets should never be less than thirty-six inches from the ceiling over it. They should be protected on top by hanging shades, and on the sides by stops on the several joints, which should prevent brackets from moving more than a safe distance." "Attention," he says, "should be called to the very common and dangerous practice of nailing tin or iron on adjoining timbers. This has long proved to be no protection, and it has the disadvantage of allowing the timber to be charred completely through before it is known." Fires often proceed from carelessness in lighting gas. Mr. Braid-

wood relates that, some years ago, upwards of £100,000 were lost through the partner of a large establishment in England lighting gas with a piece of paper, which he threw away, and thus set fire to the premises, although it was a strict rule in the place that gas should only be lighted with tapers, which were provided for that purpose.

It is hardly necessary to dwell upon the more obvious causes of fire common to all structures—such as carelessness in the use of matches, and the dropping of fire from unextinguished tobacco—the latter a constantly occurring source of conflagrations, figuring largely in the causes of fires in London; the ratio of fires for a series of years from this cause, as compared with those from spontaneous combustion, being as 166 to 43. The smoker's match, carelessly thrown away, has become a social nuisance, the great source of general conflagrations now-a-days. One insurance company in London has lately reported that its losses by lucifer matches alone amount to not less than £10,000 annually.

Special notice should be taken of a hitherto unsuspected cause of fires in mills, first noticed by the eminent mill engineer, Mr. James B. Francis, who describes, in a communication to the *Journal of the Franklin Institute*, the circumstances of the ignition of pine timber in the Appleton Cotton Mills, in 1864, through electrical sparks communicated from a rapidly moving leather belt. The belt was driven by a drum eleven feet in diameter, having iron arms and wooden lagging, making ninety-two revolutions, and transmitting a horse-power estimated at one hundred and seventy-five. The pulley driven by the belt was six feet in diameter, and entirely of iron. The peripheries of both drum and pulley were covered with leather. The belt was made of two thicknesses of leather cemented together, and about three eighths of an inch thick. It had been slightly greased on the inside seven or eight weeks before the fire with a mixture of tallow and neat's-foot oil. The part of the belt near the timber was the slack side, running nearly vertically, and at the nearest point was about eight inches from the timber. When it was first observed by Mr. Francis, a constant stream of sparks was passing between the belt and the corner of the timber which had been on fire. The charred timber indicated that about six inches of the corner had been on fire.

The electrical excitement in the mill on the day of the fire had been unusually great, although electrical phenomena, frequently observed in cotton and woolen mills, usually attract but little attention.

Mr. Francis observes that it is not unfrequent to find, on the belt boxes of a mill, an accumulation of flyings of cotton or wool covering every thing not in rapid motion, to a sensible depth. In this case the belt box was very clean, to which fact he attributes the slow progress of the fire, and the detection of its cause. He also remarks "that by the light of the fire at the Appleton Mills, it appears probable that many other fires which were totally inexplicable at the time of their occurrence, may be attributed to this cause."

[From Hours at Home.]

FIRST WEEK OF THE TELEGRAPH.

In the fall of 1850, Mr. Alfred Vail, of Morristown, N. J., gave the writer an account of the receipts of the telegraph at the Washington office during the first four days of its operation, after it had been taken under the patronage of the Government, and,at his request, Mr.Vail afterward wrote it down. That record is now before him, and from it the present statement is made, mostly in the words of the manuscript.

The telegraph was first put in operation, between Washington and Baltimore, in the spring of 1844, and was shown without charge until April 1, 1845. Congress, during the session of 1844–'45,made an appropriation of $8,000 to keep it in operation during the year, placing it, at the same time, under the supervision of the Postmaster General. He, at the close of the session, ordered a tariff of charges of one cent for every four characters made by or through the telegraph, appointing also the operators of the line; Mr. Vail, for the Washington station, and Mr. H. J. Rogers, for Baltimore.

This new order of things commenced on April 1, 1845, and the object was to test the profitableness of the enterprise. The receipts for April 1–4, inclusive, were as follows:

It should be borne in mind that Mr. Polk had just been inaugurated, and, as is always the case on the advent of a new Administration, the city was filled with persons seeking for office. A gentleman of Virginia, who stated that to be his errand to the city, came to the office of the telegraph, on the 1st day of April, and desired to see its operation. The oath of office being fresh in the mind of the operator, and he being determined to fulfill it to the letter,the gentleman was told of the rates of charges, and that he could see its operation by sending his name to Baltimore, and having it sent back, at the rate of four letters or figures for a cent; or he might ask Baltimore regarding the weather, etc. This he refused to do, and coaxed, argued, and threatened. He said there could be no harm in showing him its operation, as that was all he wanted. He was told of the oath just taken by the incumbent, and of his intention to serve it faithfully; and that if it was shown to him by the passage of a communication gratuitously, it would be in violation of his oath of office. He stated he had no change. In reply, he was told that if he would call upon the Postmaster General and obtain his consent that the operation should be shown him gratis, the operator would cheerfully comply to almost any extent. He stated in reply that he knew the Postmaster General, and had considerable influence with some of the officers of the Government, and that he (the operator) had better show it to him at once, intimating that he might be subjected to some peril by refusing. He was told that no regard would be paid to the extent of his influence, etc., be it great or little; that he did not think he was at liberty to use the property of the Government for individual benefit when under oath to exact pay; and cited the rules of the Postoffice in relation to the carriage of letters; but that he was willing to do as directed by the Postmaster General (Hon. Cave Johnson). The discussion lasted almost an hour, when the gentleman left the office in no pleasant mood.

This was the patronage received by the Washington office on the 1st, 2d, and 3d of April. On the 4th, the same gentleman "turned up" again, and repeated some of his former arguments. He was asked if he had seen the Postmaster General, and obtained his consent to his request; to which he replied he had not. After considerable discussion, which was rather amusing than vexatious, he said that he had nothing less than a twenty-dollar bill and one cent, all of which he pulled out of his breeches pocket. He was told that he could have a cent's worth of telegraphing, if that would answer, to which he agreed. After his many manœuvers, and his long agony, the gentleman was finally gratified in the following manner: Washington asked Baltimore, 4, which means, in the list of signals, "What time is it?" Baltimore replied, 1, which meant "1 o'clock." The amount of the operation was one character each way, making two in all, which, at the rate of four for a cent, would amount to half a cent exactly. He laid down his cent, but he was told that half a cent would suffice, if he could produce the change. This he declined to do, and gave the whole cent, after which, being satisfied, he left the office.

Such was the income of the Washington office for the first four days of April, 1845. On the 5th, twelve and a half cents were received. The 6th was the Sabbath. On the 7th, the receipts ran up to sixty cents; on the 8th, to $1·32; on the 9th to $1·04. It is worthy of remark, concludes Mr. Vail, that more business was done by the merchants after the tariff was laid than when the service was gratuitous.

The above details may strike many as very trifling and undignified. So they are, in themselves; but therein consists their charm and their relevancy to the subject in hand. Deep in our nature there is a principle that loves to contrast small beginnings with grand results. History is full of this. Development is characteristic of the works of God, and of the works of man as well. Nothing great ever comes all of a sudden. To the ignorant and unobservant it may seem so, but it only seems, for it is not so. It was not thus with the commonest implement of the peasant—the plow, for instance. Only of late has this—the pioneer and the honored symbol of civilization—risen to its present advanced degree of improvement, for doubtless it has not yet reached perfection. So of every other in the service of man. The telegraph is but a particular instance of a general law—development. To note a single point in its germ-period was all that the writer proposed to do.

As a *finale* to this humble scrap of history, it would seem to be eminently fit to reproduce a relation made by Professor Morse, which will explain itself. It may be proper to add, however, that the date of the midnight passage of the Telegraph bill must have been in May, 1843, as the passage of the dispatch suggested by the lady friend of Mr. Morse was on Monday, May 27, 1844, which, he says, was about a year after the law was passed.

Says Professor Morse: "My bill had indeed passed the House of Representatives, and it was on the calendar of the Senate; but the evening of the last day had commenced,with more than one hundred bills to be considered and passed upon before mine could be reached.

"Wearied out with the anxiety of suspense, I consulted one of my senatorial friends. He thought the chance of reaching it to be so small that he advised me to consider it as lost. In a state of mind, gentlemen, which I must leave you to imagine, I returned to my lodgings to make preparations for returning home the next day. My funds were reduced to a fraction of a dollar. In the morning, as I was about to sit down to breakfast, the servant announced that a young lady desired to see me in the parlor. It was the daughter of my excellent friend and college class-mate, the Commissioner of Patents (Henry L. Ellsworth). She had called, she said, by her father's permission, and in the exuberance of her own joy, to announce to me the passage of my Telegraph bill, at midnight, but a moment before the Senate's adjournment!

"This was the turning point of the telegraph invention in America.

"As an appropriate acknowledgment for the young lady's sympathy and kindness—a sympathy which only a woman can feel and express—I promised that the first dispatch, by the first line of telegraph from Washington to Baltimore, should be indited by her. To which she replied: 'Remember, now, I shall hold you to your word.'

"In about a year from that time, the line was completed, and everything being prepared, I apprised my young friend of the fact. A note from her inclosed this dispatch:

'WHAT HATH GOD WROUGHT!'

"These were the first words that passed on the first completed line of electric wires in America. None could have been chosen more in accordance with my own feelings. It baptized the American Telegraph with the name of its author."

NITRO-GLYCERIN.—Sometime since, in alluding to this destructive agent, we urged that its use should be prohibited by law. This subject is now being discussed in Europe; and in Sweden, where the article first made its appearance for blasting purposes, its use has been prohibited, and also in Belgium. The *Scientific Review* calls upon the British Government to follow the same example as a truly humane and praiseworthy act.

ENGLISH IMPROVEMENTS IN SMELTING IRON ORES

An ironmaster of Wolverhampton, England, writes to the *Ironmonger* of improvements now in operation in the Cleveland district, as follows:

"On entering the Cleveland ironmaking district any one from Staffordshire must be struck with surprise that not a flame is to be seen coming from any of the furnaces, except at intervals for a few moments. This is consequent on their way of utilizing the tunnel head gases. They close the throats of their furnaces by means of two castings, a cap and a cone. The cap, which is rested on the brick work of the furnace, has no bottom, but the opening is filled by a cone held in its place by machinery so arranged that when the cap is charged it can be lowered, and so permit the materials so charged to escape into the furnace. The Cleveland ironmasters, most of them, think that a better distribution of materials is insured by this mode of filling, and that it is an easy and inexpensive way of collecting the tunnel head gases. We, however, in Staffordshire, who use the gases, do not agree in thinking a close top at all desirable or attended with a saving of expense in the long run. In the first place, it actually prevents the furnace from being filled by some feet, in order to lower the cone, and also it is impossible to know, without going on to the furnace top and feeling with a rod through a hole made for the purpose how far the furnace is from being full, and as nothing tends to regulate the quantity of iron made more than keeping a furnace filled to one exact hight, this is an objection. The gases, where the top is closed, are usually blown by force of engine, not only through the materials in the furnace, but into and out of the gas pipes, of whatever length, size, or shape may happen to be the firing furnaces, flue, and indeed the chimney tops. The back pressure caused by this is very objectionable. We prefer to exert, by means of a good chimney, such an amount of suction beyond all firing places as to draw the gases, or their products of combustion, from the furnace into the mains, and on through firing places and flues by its very suction, thus rather encouraging the furnace to drive, instead of by back pressure tending to hinder the driving. Another advantage of the open over the close top is that the gas being drawn off is ncluded to mix with the air necessary for combustion, whereas in the other case it comes off at a pressure, and consequently is not so inclined. From being at a pressure it is liable to leakages, and may accumulate, so causing explosions, whereas, wherever it is drawn through a leak, it will, by the same power, be carried on into the chimney, and so rendered harmless. I am pleased to be able to state that one Yorkshire firm work our open-topped system and, in spite of all they hear from Cleveland ironmasters and managers as to the superiority of closed tops, after years of experience in working open ones, having just raised one of their furnaces very considerably, they have again applied our open top system, which they informed me works admirably.

INCREASED HIGHT OF FURNACES.

"The point, however, in which nearly all the Yorkshire furnaces, especially the most improved, differ most widely from ours is in their great hight, also in width of bosh. Six years back furnaces were built in Yorkshire very much as they were in Staffordshire, and at that time their yield of fuel varied from thirty to thirty-six cwt. of coke per tun of iron made. At the present time the hights of furnaces vary from seventy-five to one hundred and five feet, while boshes are of all dimensions, from sixteen to thirty feet. Their yields of coke, too, have varied with the increased hight of furnace and diameter of bosh to an average varying from twenty-eight cwt. down to sixteen cwt., if not lower. These increases to both hight of furnace and width of bosh have taken place so simultaneously, and the temperature of blast has also been so increased during the same time, that it is very difficult to decide to which of the improvements the better yield of coke is chiefly due. I should have felt very doubtful on this point myself, had it not been that Mr. Horton, of Lilleshall, has raised his four cold blast furnaces at the Lodge twenty feet without increasing their size of bosh, and thereby saves seven cwt. of coke to the tun of iron. This hight of furnaces I consider to be the most important question for Staffordshire. Are we using, say five cwt. to the tun more coal than we need, if only our furnaces were raised a few feet; in other words, where about thirty-five cwt. of coal are used might we do with thirty? If so, at a make of 150 tuns of iron per week, and charging the coal as worth 8s. per tun delivered into the furnace, the saving would amount to £780 per year per furnace. If we could get rid of coal or coke, the quality of resulting iron must be improved, as coal or coke is the great sulphur carrier. There are over-careful ones who are not inclined to look favorably, or even hopefully, on any improvement that is likely to necessitate a change in their plant, as it now stands; and others, from opinions formed, I consider errroneously, say, "But our coal or coke is too weak, and would be crushed by the increase of hight of column of measures charged." I answer, it has not proved to be so in Shropshire, nor is the cold blast prevented from entering the furnace, though blown at the same pressure and in the same way as before; namely, about 31 lbs. pressure through the leather bags and open muzzles, usual in cold blast furnaces, into the cold blast furnaces, muzzles not even jointed into tweers. I firmly believe that our furnaces, and coal, or coke, will bear increased hight, provided they are not made much wider. Indeed, I consider that increase of hight does not to any very great extent increase crushing weight, as the materials rest at the bottom on the bosh, which causes those above to carry themselves to a very great extent against the sides. It is well-known that if you fill a tube with very fine materials the downward pressure is not anything like equal on the bottom or any other part of

them to what would be due to the hight of an unsupported column. This is a thing that ought to be settled by positive experiment, as to every coal in the district, on one experimental furnace. We shall certainly work coals that are not now considered worth trying, just as years back no one would consent to work new mine, or as they then called it, stinking coal, in a furnace. I know, though it was before my time, an instance in which 500 or 1,000 tuns of first-rate new mine coal were offered to be given if it was worked in the furnaces, so as to prove it a furnace coal. It now works to fully as good a yield as thick coal.

HIGH TEMPERATURE OF BLAST.

"Ironmasters in Cleveland, and some other districts also, now use blast of the very highest temperature they can raise, and consider that every increase of heat saves a further very considerable portion of the coal necessary for smelting, besides improving the quality of iron by removing coal, the chief supplier of sulphur. As this heat is raised by the combustion of tunnel head gas, of course it is done at a very trifling cost. My cautious friend, however, will again say 'Yes, but what is the wear and tear on stoves,' particularly when I tell him that in one or two instances I have heard it said it does not do to trust to pyrometers; the best way is to make sure of your blast pipes being red hot. There are, however, several ways of avoiding such fearful wear; namely, by having such a large internal area of stove pipes at work per furnace as shall pass the blast slowly enough to cause it to be heated to the same temperature as the pipes it is passing through. Iron pipes may be safely kept at a dull red heat, as witness a plumber's iron. A better way still is to use Cowper's or Whitwell's fire brick stoves. Where it is wanted to keep the blast at such a temperature as shall easily smelt lead or zinc, one of the best ways of proving its temperature is to drill a half or three quarter hole nearly through the cast iron of muzzle pipes and put a bit of zinc or lead to boil; in trying, pass a bit of wire through the metal to see if it is in a liquid state.

CLOTHING BLAST PIPES.

"Another thing of which the Cleveland ironmasters are very careful, and which we have proved the very great value of, is to clothe every bit of hot blast pipe very carefully with some good non-conductor. The cheapest and best plan of doing this is to take one part of salt, one of whitening, and two of puff of cinder (to make puff of cinder, fill a molder's hand ladle with liquid cinder, and then empty the cinder into cold water; it must be crushed afterwards). To the above four parts, add a good quantity of cow hair and mix up with water to a proper consistency for plastering. For first coat make it so liquid that it can be put on with the whitewash brush, and afterwards lay it on with a trowel as roughly as possible, not more than half an inch thick at a time. After three coats wrap it with iron wire, and you can continue this to any thickness you like.

CALCINING KILNS.

"Another most valuable improvement which they invariably use is that of close-running calcining kilns for burning the ironstone. This is doubly valuable to us in Staffordshire, on account of the cost of our ironstone as compared with theirs. Ironstone raw costs them from 3s. to 5s. 6d. per tun, delivered into their kilns; while the expense of ours is from 17s. to 18s.; kilns also save largely in fuel and labor, one tun of very fine slack being enough to calcine twenty-two of stone, while one man and an engine boy can calcine all the stone required to make 400 tuns per week. The Yorkshire mode of running the cinders on to the top of wagons is also attended with a large saving of labor. No doubt there are other things which escaped my eyes, but these are quite enough to show the rapid strides the northern masters have made and how important it is we should adopt all useful improvements."

The Science Association.

The American Association for the Advancement of Science convened at Salem on August 18th. A large number of the most prominent American scientists, as well as a considerable number of lesser lights, were present. We are unable to give extended space in this issue to the proceedings of this learned body.

The first session was opened by an interesting address from Henry Wheatland, of Salem, Chairman of the Local Committee.

After a response from the Mayor a short business meeting was held. Professor F. W. Putnam was appointed to act as permanent Secretary in the absence of Prof. Lovering. The Secretary read a list of eighty new members, who were unanimously elected. Prof. Agassiz invited the members to visit the Museum of Comparative Zoology at Cambridge. Owing to the excessively limited capacity of the museum, in comparison with the size of the collections, they would have to come in small bodies, but he would do the best he could for them.

Prof. Pierce intimated that the astronomers had some revelations to make on the subject of the recent eclipse. The President replied that a general session would be held some evening in the ensuing week for the purpose of hearing them. The general meeting was then adjourned until ten o'clock to-morrow. The organization of the sections A and B was then effected by the choice of the following officers: Section A, of Mathematics and Physics—Chairman, Prof. Silliman; Secretary, Prof. Henry Wurtz, of New York; Standing Committee, Prof. Barker, of New Haven; Prof. Murray, of New Brunswick, N. J.; Prof. Rogers, of Alfred Center, N. Y. Section B, of the Natural Sciences—Chairman, Prof. Agassiz; Secretary, Prof. T. Sterry Hunt; Standing Committee, Profs. O. C. March, A. C. Hamlin, and E. D. Cope. After the election of these officers, the sections adjourned

In the afternoon the Association was present by invitation at the dedication of the Peabody Academy of Science. The exercises consisted in the formal transfer of the East India Marine Society's Hall and Museum to the Peabody Academy, and five set addresses at the Tabernacle Church. The ceremonies were of necessity somewhat complex and protracted. First, Mr. William C. Endicott, President of the Academy, opened with an account of Mr. Peabody's gift, and the object and aims of the Peabody Academy. Then the Hon. J. H. Clifford, of New Bedford, spoke on the part of Mr. Peabody. His Honor, Mayor Cogswell, spoke for the town of Salem. M. B. H. Silsbee, President of the East India Marine Society, gave a sketch of the history of that notable institution, which was, and is the object of the just pride of Salem.

Mr. Wheatland spoke for the Essex Institute, younger but scarcely less renowned than the Marine Society itself. Finally, Col. Foster had to speak for the scientific men, pilgrims, as it were, at the shrine of Salem and Peabody. The Marine Society dates back to 1799. Membership was restricted from the first to those who had doubled the Cape, either as supercargo, factor, or commander of a vessel. In those days the East India commerce of Salem was the pride of America. In the number of its ships and the value of its trade Salem was far ahead of either Boston or New York. The objects of the Society were to assist by its funds the widows and orphans of deceased members, to improve the art of navigation, and to form a free museum for the instruction and delight of Salem. In all these undertakings the East India Society was singularly successful. Dr. Nathaniel Bowditch, while filling an office in connection with this Society, prepared that dictionary and bible of sea captains known as Bowditch's Practical Navigator, a work which has remained for more than a generation without a rival. The museum treasures up the essence of a thousand voyages, is rich in the romance of the sea and of the past, and has besides a scientific value which can hardly be overestimated. As the commerce of Salem declined, the race of circumnavigators began to die out. Of 348 members of the once-proud Marine Society, only 70 survive Just at the right moment Mr. George Peabody, by a munificent gift, placed the treasures of the Museum in security from all future auctioneers, and gave them even new claims to respect by uniting them with the cabinets of the Essex Institute. It was this union which was cemented and celebrated to-day. The East India Society have parted with their building and collections to the Peabody Academy, which certainly starts with as much capital, both mental and material, as any similar institution in the country.

We will in a future issue notice the subsequent proceedings of the Association.

Heating Cars by Steam.

Practical experiments on a large scale have been made in Germany on this subject especially by the Brunswick Government R. R., the Prussian Eastern R. R., the Hanoverian Government R. R., and the Lower Silesian R. R.

On the Brunswick R. R. the steam was taken from the boiler of the locomotive, passing through a small cock of 1¼ in. interior diameter, into a large pipe of copper about 20 in. in diameter. Two such copper pipes were laid lengthwise below the floor of each passenger car, and connected by hose with the pipes of the adjacent cars. The pipes were covered by a grate along the walking floor. Under the seats they were covered by a wide box of sheet iron, open in front, so as to let the heat into the compartment and to protect the seats from the immediate radiation. These arrangements effected an increase of temperature in the cars of about 25° Fah., which is quite a favorable result.

On the Prussian Eastern R. R. the heating by steam of the passenger and baggage cars of the express trains was introduced in January, 1865. The steam is produced by a small tubular boiler standing in a compartment of the baggage car, and is carried along the train through a 1¼ in. pipe fixed to the lower part of the wagons. The maximum steam pressure is 30 lbs. The pipes are joined by caoutchouc hose between the wagons. The heating of the compartments is effected by hollow cylinders connected below with the above described main pipe. The admission of the steam into the cylinders is regulated by cocks or valves from the outside of the wagons. It has not been found convenient to have this regulation done by the passengers from the inside of the compartments, and all the arrangements put in at first for this purpose had to be removed. The temperature in the wagons can easily be increased 50° Fah.

The steam pressure is very nearly the same over three wagon lengths, and consequently the heating power of the cylinders is about equal in the first three wagons. The above arrangements would therefore be sufficient for a larger number. No objections or difficulties of any importance have been met with in using this system. The trains are running regularly over a distance of several hundred miles. The consumption of coal is about 1½ lb. per English mile, thus causing but a very small expense.

The Hanoverian Government R. R. runs daily two mail trains, with steam heating, between Cologne and Berlin. The steam is generated in a small tubular boiler put up in a compartment of the baggage car. The heating pipes are laid through the cars lengthwise, their axes being about at the level of the floor. The wagons of one train contain four parallel pipes of wrought iron, those of the other train contain but two pipes of sheet iron. Both kinds of pipes have a diameter of 2⅞ in. They are situated at a hight of but one inch between the passenger seats, and located there immediately below the floor, so that a thin sheet of iron with which they are covered is even with the floor level. The emanation of the heat takes place principally below the seats, where the pipes are uncovered. This emanation can be lessened and regulated by valves so arranged as to cover the pipes more or less. The valves can be worked from the outside of the cars by the employés, as well as from the inside by the passengers. On the first trial of these heating arrangements the temperature of the air was raised from 41° to about 60° Fah. The consumption of coal amounted to 25 lb. per hour, during which time 175 lbs. of water were used. The whole arrangement has been found good and convenient. Further experience will show if it will prove sufficiently effective in severe frost.

The steam heating machinery actually in course of construction on the Lower Silesian railroad, is similar in principle to that of the Hanoverian railroad. The details are not yet known.—*Van Nostrand's Magazine.*

Hartford Steam Boiler Inspection and Insurance Company.

The following report of inspections for the month of July is made by this company:

During the month 337 visits of inspection have been made, 552 boilers examined—471 externally and 202 internally—and 45 tested by hydraulic pressure. The number of defects discovered 173, of which number 28 were especially dangerous. These defects were as follows: Furnaces out of shape, 16—1 dangerous; fractures in all, 118—3 dangerous; burned plates, 26—1 dangerous; blistered plates, 34—1 dangerous; cases of incrustation and scale, 43—4 dangerous; cases of external corrosion, 35—3 dangerous; cases of internal grooving, 8; water gages out of order, 7; blow-out apparatus out of order, 5—3 dangerous; boilers without blow-out apparatus, 5; safety valves overloaded, 12—3 dangerous; safety valves inoperative, 3—all dangerous; pressure gages out of order, 40—4 dangerous; boilers without gages, 2; boilers with broken stays, 2; cases of deficiency of water, 2—both dangerous.

In one of the cases reported, the fracture was so great and the water escaping so freely, that it was with difficulty the water in the boiler could be kept at the proper level, with the pump constantly running.

In the case of blistered plate, reported dangerous, after the blister had been trimmed off the plate was left so thin that the inspector's hammer easily went through it.

Of the cases of scale in boilers, several were found to be from one fourth to one half an inch in thickness.

In the dangerous cases of corrosion, the plates were found so badly eaten into that the inspector's hammer penetrated them.

Of the three dangerous cases of inoperative safety valves, two were reported by the inspector as having the loads placed at proper points, but it was found that, in addition to these the "trap doors" in the floor above were bearing on the top of the weights. In the other case the inspector found a heavy timber resting on the lever, which had fallen there quite unknown to the engineer.

The importance of trying the hight of water in boilers before firing up should be thoroughly impressed upon watchmen. It was forcibly illustrated at one of our agencies during the month, as following: An appointment was made to inspect a new cylinder boiler used in a stove foundery, at 6 A.M. When the inspector reached the boiler room he found a brisk fire under the boiler, which had but about two inches of water in it. Happily the watchman had left the furnace doors open, so that the boiler was not red hot. Upon inquiry it was found that the proprietor had blown off the boiler the previous evening, but had forgotten to notify the watchman not to fire up as usual. The man-hole plate had been left in the boiler, and the watchman, seeing no indications to the contrary, supposed all was right.

Comparison of the Covering Powers of White Paints.

The following is a test now adopted by many dealers for testing the covering powers of white pigments: "Fine, buff Manilla wrapping-paper, stretched on frames of wood, is painted with best coach black, and varnished until the surface presents a glassy smoothness. To cover and conceal this shining black surface, and present a *white* surface, is the object of the test; the utmost care being taken all through to note the exact number of grains, by weight, of material used in each and every coat. No turpentine is used in the painting, the paints being thinned with linseed oil to a proper consistency for spreading evenly under the brush. The first coat is applied to the whole surface of the paper; the second to a fraction more than three fourths of the sheet, a portion being left in every case, whereby to compare the effects produced by the successive coats.

"It will be understood that a separate sheet is used for each brand. Size about two and one eighth square feet."

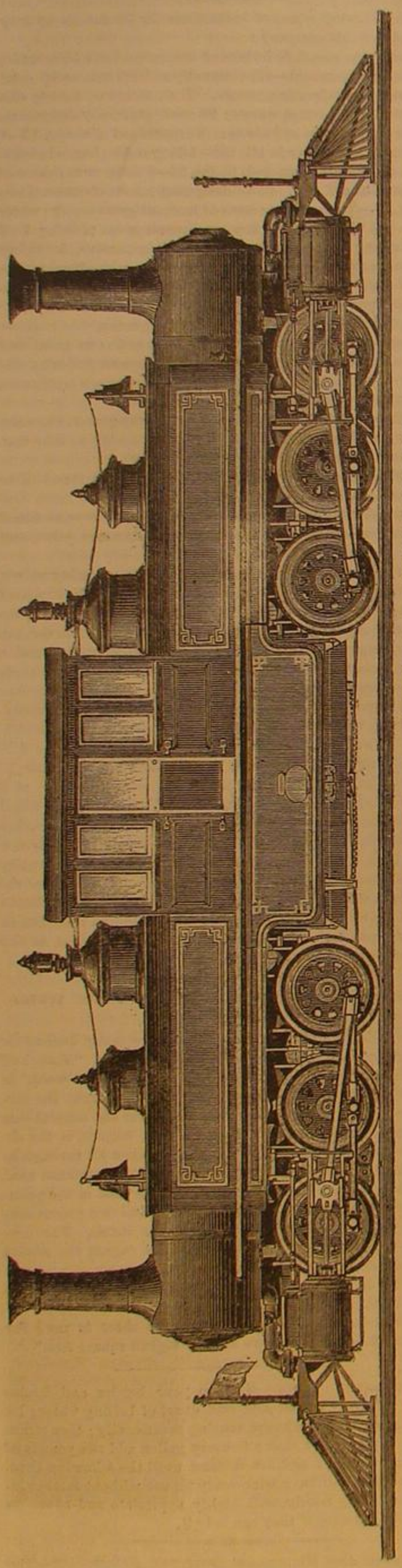
BLACKBERRY WINE.—Measure your berries and bruise them; to every gallon add one quart of boiling water; let the mixture stand 24 hours, stirring occasionally; then strain off the liquor into a cask; to every gallon add two pounds of sugar; cork tight, and let it stand until the following October, and you will have wine ready for use without further labor, that every family will highly appreciate and never do without afterward if they can help it.

FARMERS AND MECHANICS' INSTITUTE, EASTON, PA.—The Eleventh Annual Fair of this Association will be held at Easton, Pa., commencing Tuesday, Sept. 14, 1869, and ending Friday the 17th. A large number of premiums are offered. Entries should be made before 5 o'clock on the 13th. The entry books will be opened on Monday, Sept. 6th, at the office of the Secretary, James M. Porter, Esq., in Easton, who may be addressed by parties interested.

Improved Locomotive for the Pacific Railroad.

Our engraving is an example of the Leggotype process, a photographic method of reproducing engravings of all kinds, the invention of W. A. Leggo, of Montreal, Canada. The process is now extensively practiced at Montreal by Leggo & Co., where they have a large establishment. We have examined many excellent specimens of their reproductions.

The double locomotive, of which we here give an illustration, was designed by Robert F. Fairlie, and constructed for the Central Pacific Railroad by Messrs. William Mason & Co., of Taunton, Mass. Of this engine, which is intended to be employed on the Sierra Nevada inclines on the western side of the summit, we herewith publish a side elevation. The engine is carried on six pairs of 3 feet 6in. wheels, disposed in two groups as shown, each group being driven by a pair



DOUBLE-BOGIE LOCOMOTIVE FOR THE CENTRAL PACIFIC RAILROAD.

of 15-in. cylinders with 24-in. stroke. The tractive power will thus amount to 257·14 lbs. for each pound of effective pressure per square inch on the pistons, or with a mean effective cylinder pressure of 100 lbs. per square inch, the engine will exert a pull of 25,714 lbs., or very nearly 11½ tuns. The weight of the engine in working order is 54 tuns, or about 4½ tuns per wheel, and as the whole of this weight is available for adhesion, we have no doubt that the great tractive power of the engine will be fully utilized.

The engine has about 1,650 feet of tube surface, 125 feet of fire-box surface, and a fire-grate area of about 25 square feet, so that it will no doubt have ample steaming power. The water is carried in a pair of wing tanks, holding collectively 3,000 gallons; and coal bunkers are provided capable of carrying 2½ tuns of coal. Altogether, we believe that the engine of which we have above given particulars will be found well designed for the work it will be called upon to perform, and we anticipate that it will prove to be the forerunner of a number of locomotives of a similar type. Mr. Fairlie's system of locomotive construction is pre-eminently adapted for use on such a line as the Pacific Railroad, and indeed for American lines generally, and from the favor with which his plans are already being regarded by some of the leading railroad engineers in the United States, we believe that the practical results obtained with the engine we illustrate will be watched with great interest.

Velocity of Projectiles.

At the conclusion of the President's address, delivered before the Institution of Mechanical Engineers, at Newcastle, England, on the evening of August 3d, Captain Noble's apparatus for determining the velocity of projectiles in various parts of the bore of a gun was exhibited in the library of the Literary and Philosophical Society. The instrument was explained and various experiments were conducted by Captain Noble, in the presence of most of the auditory who had been present at the delivery of the address.

The object of the instrument, which was called a chronoscope, was stated to be the measurement of very minute portions of time, and it had been specially constructed with reference to artillery purposes. In describing the means that had been adopted for obtaining and retaining a uniform motion, Capt. Noble pointed out that the instrument consisted of half a dozen disks placed on an axle, these disks being put in motion by means of a heavy weight, and their relative velocity being regulated by a train of toothed wheels.

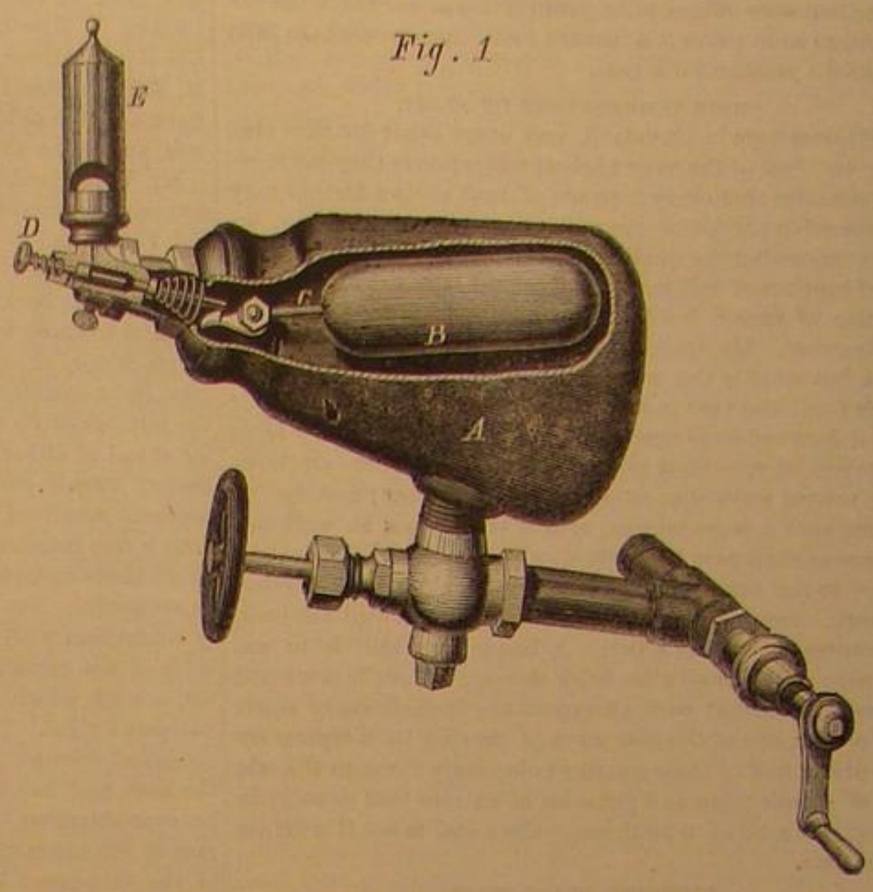
A uniform and very rapid rotation was thus imparted to the disks; each of which bore a certain ratio to the one preceding it. Knowing the speed of one, therefore, they would readily calculate the rate of revolution of the most rapidly revolving disk; and by a special clock-work arrangement the precise speed, to hundredths of a second, could be indicated at any moment. Supposing the first toothed wheel to describe five revolutions within a second, the last of the series would revolve 750 times—the same space of time—such was the ratio of one disk to the other. The weight was so arranged that any required speed could be obtained. The speed was generally—taking the velocity at the circumference—from 1,000 to 1,200 inches per second. If it were exactly 1,000 inches per second, an inch of rotation at the circumference of the wheel would represent the thousandth part of a second; and so by an arrangment attached to the instrument, they were able to read to the thousandth part of a second; the time actually capable of being measured, so far as the rotation of the wheel was concerned, was the millionth part of a second. From experiments recently made at Woolwich to determine the speed, it was found that 750 revolutions were made in 24·4 seconds, second and third experiments giving 24·2 and 23·9 seconds respectively. Another series of experiments gave the 750 revolutions in 23·4, 23·5, and 23·4 seconds, and on a third occasion 23·3, 23·4, and 23·5 seconds. The instrument was, therefore, almost absolutely accurate. Capt. Noble next showed the mode of registration, which was effected by means of an induction coil. In measuring the velocity of a projectile, the primary wire of the coil was attached to any point of the barrel of the gun, or a set of wires might be so attached at intervals along the barrel, and at the instant of the passing of the shot, the wire or wires would be cut by the projectile, and an impression would be left upon the disk, which was covered with prepared paper for receiving the spark. Each of the disks might be attached to some portion of the gun barrel by a separate coil, and the precise moment of time at which the shot passed the identical spot would be most accurately recorded upon the disk. An experiment was performed very successfully with the view of more clearly showing how exactly and perfectly the apparatus performed its object; the gun being fired, the six sparks were instantly perceptible, and the velocity of the projectile, through as many portions of the bore, was indicated. Capt. Noble then showed how this valuable instrument was intended to be applied to a useful purpose, and he referred to experiments now going on at Woolwich to test the respective powers of slow and fast burning powder. The results, so far, had shown that the time taken by the slow burning powder to project a shot a certain space was five times that of fast-burning powder; that the velocity of the two, at the muzzle of the gun, was about equal, and that the pressure of the fast-burning powder acting on the gun was about double that of slow-burning powder.

ELECTROTYPE plates for printing were made at the same time, without mutual knowledge or concert, by Professor Jacobi, of St. Petersburgh, and J. C. Jordan, of England, in 1839.

Patent Safety Apparatus for Steam Boilers.

Steam power is now so generally used that any thing constructed for the purpose of promoting safety must be regarded with much interest by almost every one. It is doubtless the case that many of the accidents occurring to steam boilers are the result of a lack of water at some time, and which might be prevented if a reliable alarm were in use

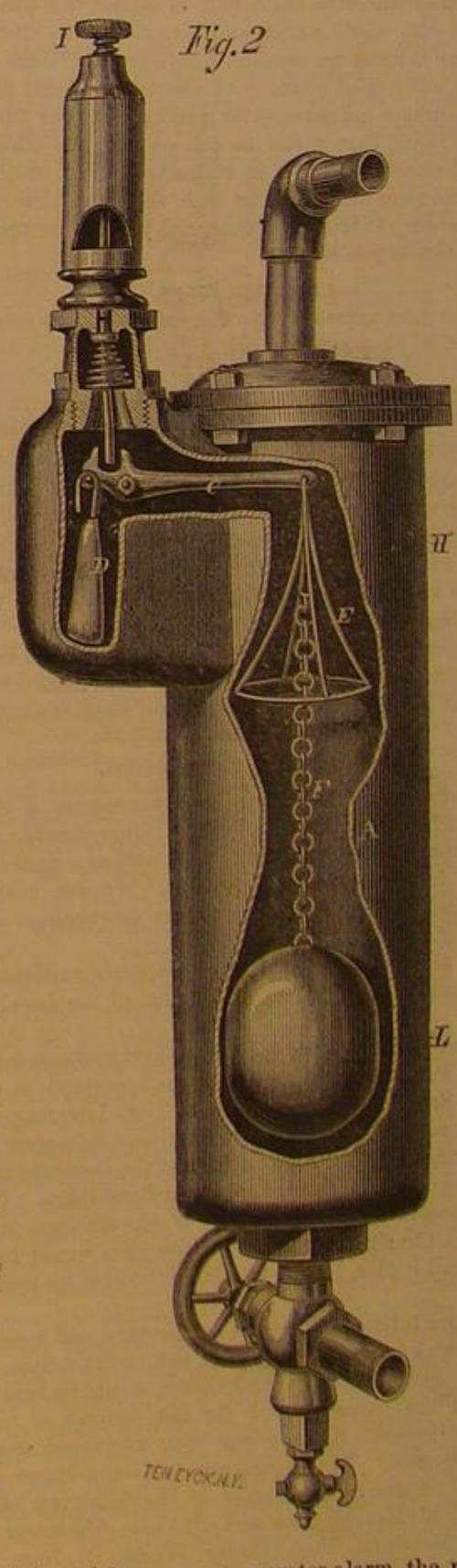
Fig. 1



THE LYNDE SAFETY APPARATUS FOR STEAM BOILERS.

The engravings presented herewith illustrate safety appliances, by the use of which, it would seem, much of accident and repair might be avoided.

Fig. 2



Figs. 1, 2, and 3, represent a water alarm, the novelty of which consists in the construction and operation of the valve, and also that they are self-detectors, as it seems impossible that they can get out of order without at once showing it—a fundamental requisite for safety in use. The valves and springs shown are similar in all, the levers which move them being operated by floats under different arrangements.

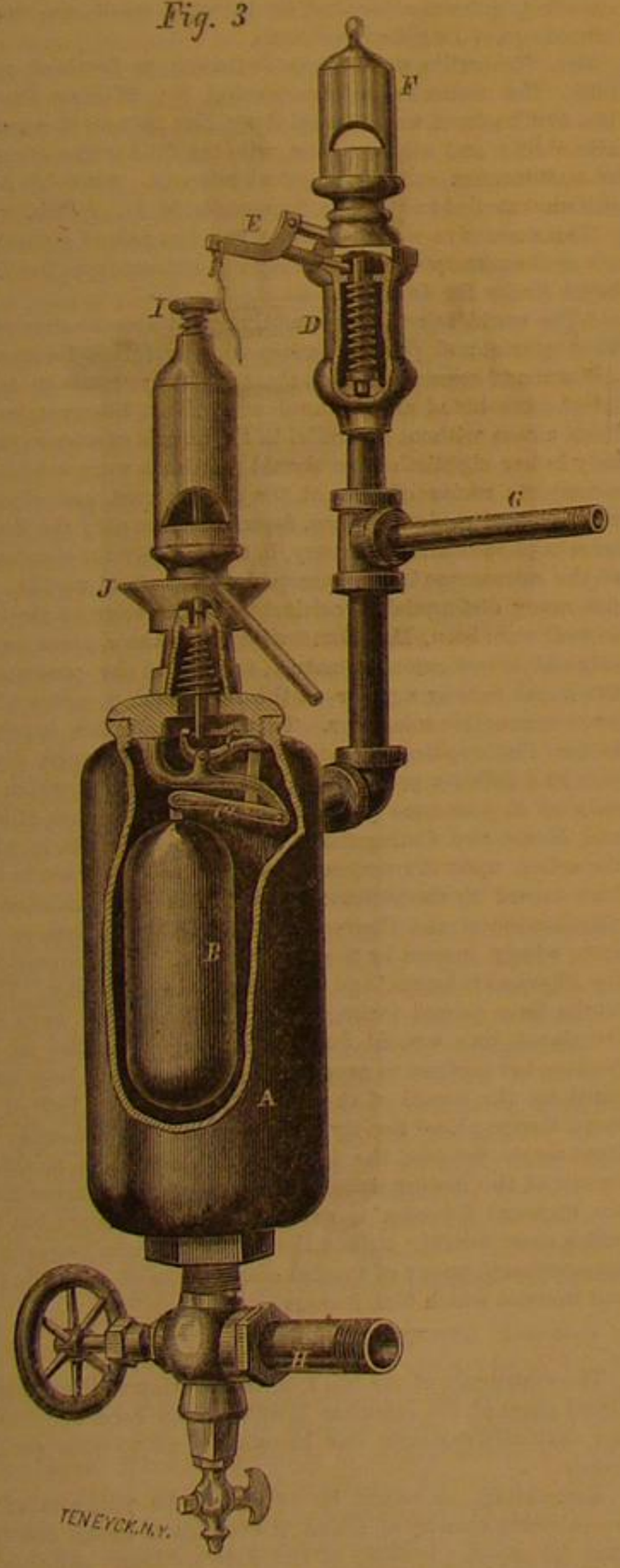
Fig. 1 is simply a low-water alarm. A is a cast-iron case about eight inches long and six inches wide at the large end, and has a clear space or chamber inside three inches wide. B is a copper float five inches long and two inches diameter (coated inside and out with a non-corrosive metal), which hangs loosely on a pin, by lever, C. The valve is seen held to its seat by the conical spiral spring. D is the knob on which pressure is applied to test the valve.

OPERATION.—Being attached to the boiler by a single pipe, while the water in the boiler is above said pipe, the case is full, but if the water in the boiler falls below the pipe the water in the case falls out, the float drops, the lever, C, strikes the valve stem, tipping the valve on its seat, and steam rushes through and sounds the whistle, E. Start the pump or injector, and as the water rises by the pipe, the case fills, and the instrument is quiet again, ready to repeat the operation; no expense is incurred and no attention required. This is shown connected to a T, in which is also one of the gage cocks, which is found to be a favorite way to attach them, as it is then unnecessary to bore the boiler—simply using a nipple and T in the same hole where the gage formerly was.

Fig. 2 shows an alarm both for low and high water, and is connected to the boiler by a steam and water pipe; thus the water in the instrument will be on the same level as that in the boiler. A is a cast-iron cylindrical case sixteen inches long and four inches in diameter. B is a copper float—three and a half inches diameter, constructed as in Fig. 1—suspended from the lever, C, by the wire frame, E, and chain, F. D is a weight which keeps the lever, C, in a horizontal position when not being acted on by the float. The chain is constructed of German-silver wire and of round links, so it can neither corrode readily nor kink. The valve and spring are seen the same as in Fig. 1. H is the high-water, and L the low-water alarm line. When the water falls the float pulls down the lever, C, tipping the valve; and when it rises too high the float strikes the frame, E, the lever is pushed up, and the valve is tipped the other way, causing an alarm in either case. By pressing on the knob, I, the whistle is sounded at pleasure.

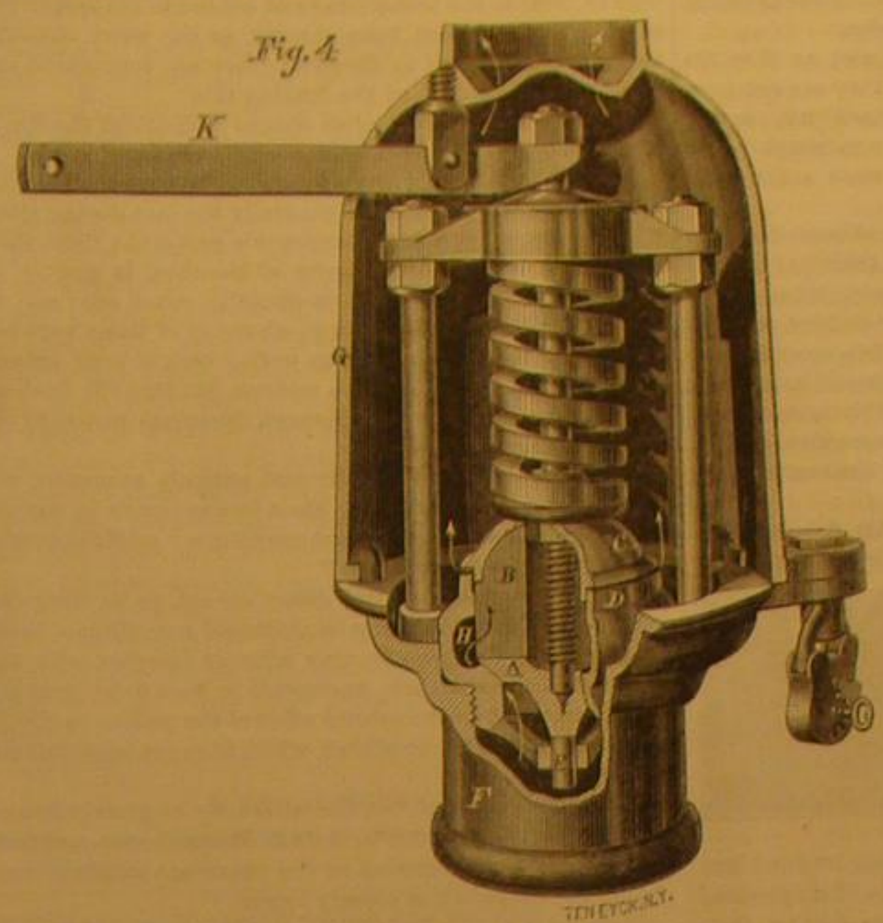
Fig. 3 represents alarms for low water and high steam—or either alarm may be used separately—the whistles being separate and having different sounds, so as to avoid confusion. A is a cylindrical case of iron or brass, about eight inches

Fig. 3



long and three inches diameter, in which is supended a float, B—the same as B, Fig. 1—by compound levers, C and C'. The same construction of valve and spring as in Figs. 1 and 2 will be noticed; D is a small spring safety valve—the valve is the same as in the water alarm, but is on the top of the seat instead of the under side. E is a lever and pin for trying the valve. J is a cup and pipe to carry off any drip from the valve; G is the steam connection, and H the water connection to the boiler. This instrument may be attached so that the water in it will be on the same level as in the boiler, or so that the alarm line for low water will be at the

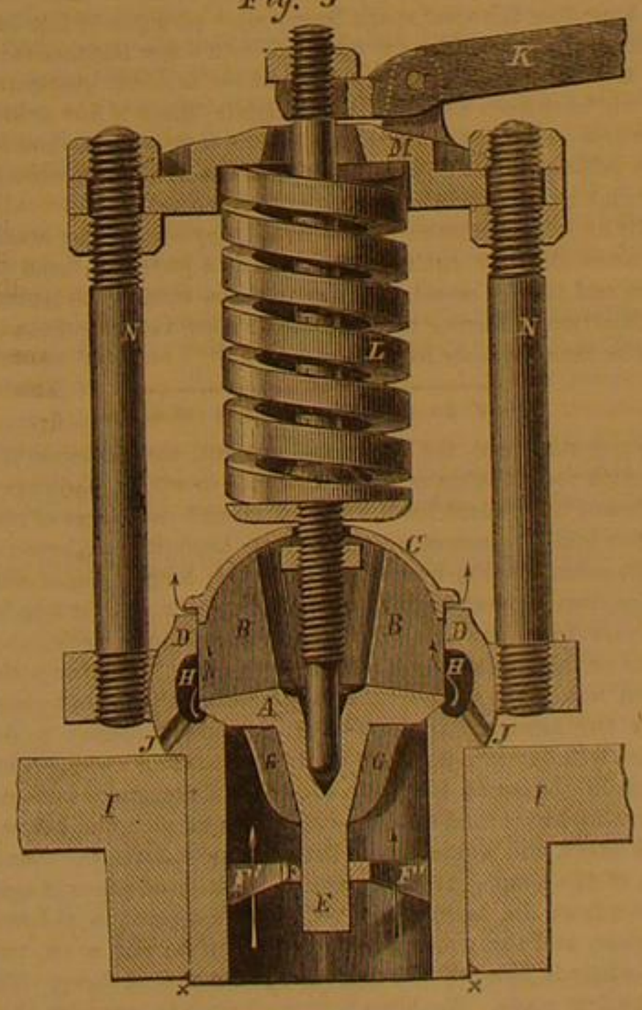
Fig. 4



point of connection as in Fig. 1. The operation is similar to the others, and will be readily understood without further description. The high steam alarm simply sounds the whistle as the pressure becomes strong enough to raise the valve which is set by a screw to the required pressure.

Fig. 4 shows a locked safety valve, the novelty in which consists in the construction of the valve and seat. In Fig. 5 the same valve is shown constructed so as to be applied to the dome cap of a locomotive, of which I is a section. As Fig. 5 shows a vertical section of the valve it can be better described by it, and the operation is the same in both. A is the valve; B, guide wings on top of the valve and connecting the concave disk, C, thereto. D is the rim, against which the guide wings bear. E is the guide pin to the valve. F is the guide nut. F' is the guide nut braces. G the wings to strengthen the guide pin, E. H is the annular passage for steam around the valve, by which the steam is turned up against the disk, C. K is a lever of any suitable length for trying the valve. The valve is held down by the spiral spring, L, and set as re-

Fig. 5



quired by the crosshead, M, and bolts and nuts, N N. The result being a safety valve that will rapidly discharge the surplus steam and cause no waste by blowing the pressure lower than when the valve commences to alarm.

OPERATION.—When the valve, A, begins to rise, the steam will pass through the narrow space (about one sixty-fourth of an inch) between the disk, C, and rim, D. If the pressure then rises, say a couple of pounds higher, the valve opens wider—while the space between the rim and disk has not increased, the sides being vertical—and more steam will pass into the passage, H, than can pass by the disk, C; then the whole force and velocity of the escaping steam will be exerted on the disk carrying it suddenly upward, with the valve, overcoming the increased power of the spring, and permitting the steam to blow off rapidly until the pressure has fallen to near where the valve started to alarm, when it will suddenly close, thus simply blowing off the surplus steam. Fig. 4 shows the valve as it is locked in a case (the whole hight of the holder and cover being about eleven inches and a half, and about six inches diameter). It cannot be tampered with without violating some of the parts, thus apparently preventing, as far as can be done by machinery, an over-pressure of steam.

The water alarm was patented Feb. 11, 1868, and the safety valve May 18, 1869, by J. D. Lynde, 405 North 8th street, Philadelphia, where he can be addressed for further information.

Hammering Iron until It Is Red Hot.

In his lectures on "Heat," delivered recently at the London Institution, Mr. G. F. Rodwell alluded to a singular case of motion transformed into heat; namely, the rendering of iron red-hot by repeated strokes of the hammer. If Mr. Rodwell, who is so well versed in the history of science, will turn once more to the works of Robert Boyle, he will see that this "father of chemistry" had notions of the transformation of mechanical movement into heat very nearly akin to, if not quite identical with, those professed at the present day. Robert Boyle alludes to the rapid development of heat in an iron nail by repeated blows of the hammer *after it has ceased to travel* into the wood. It has been asked whether iron could be hammered cold until it became red-hot. Mr. Rodwell informs us that it can. Having requested a blacksmith to try the experiment, a piece of very tough iron was hammered with a moderately heavy hammer; it became hot, but would not scorch a piece of paper. It was then hammered by two men, one of whom used a sledge hammer, but with no better result. Presently a man, who was working in the shop, said he had often lit his forge fire by this means before matches were plentiful. He took a nail such as is used for horseshoes, and, after hammering for less than two minutes with a light hammer, part of the nail was brought to a bright red heat. The blows were light but frequent, and the nail was partly turned at each blow.

MONSTROSITIES AMONG TROUT.

BY A. COOLIDGE, M.D.

The egg of a fish consists of an enveloping membrane containing the yolk or vitellus. The first step in the development of the egg is the formation of innumerable cells on the surface of the vitellus, which are closely packed together, and form a new membrane or layer surrounding the vitellus. The next sign of organization is the thickening and condensation of one spot of this new layer. The thickened part has an elongated oval shape, and in its center, running longitudinally, is a delicate line or furrow.

This is the first beginning of the fish. The backbone of the fish is formed around this furrow. The anterior extremity spreads to become the cavity of the brain, and the tail grows from the posterior end. The yolk remains inclosed in the new layer as in a sac; as the fish grows this sac becomes constricted, so that the upper part of it is taken up into the body of the fish, while the lower part remains hanging out, and is called the umbilical vesicle, and it is in this condition that the fish is hatched. He is attached to the upper part of the umbilical vesicle, which, being too heavy for him to move, he remains anchored by it, as it were, at the bottom of the stream, wriggling only his head and tail. The fish is fed by the absorption of the contents of the vesicle which decreases every day as he grows larger. After some days he is large enough to swim about with the vesicle under him, and, at the end of forty to fifty days, the sac is no longer to be seen, and the fish swims freely about.

All fish, however, are not perfect, and oftentimes deformed ones are met with. Sometimes, instead of there being one fish only attached to an umbilical vesicle, there are two; not two separate ones, but two heads attached to one body, or two bodies attached to one tail, as shown in Figs. 1 and 2. This curious partial duplication of the fish takes place in the egg long before it is hatched, and is due, probably, to a bifurcation of the furrow around which the backbone of the fish is formed. The cells of the thickened oval spot, instead of forming one straight furrow, for some reason or other, form one in the shape of a Y. Two backbones form around the two branches, with two heads, while one tail has to do for both.

As far as has been observed, it is always the anterior part which is duplicated. No one body with two tails has been found. The tail remains single while the head and body are doubled; and this duplication varies from a partial division of the head only to two nearly complete fish, with different brains, and hearts, and stomachs, and whose hearts do not even beat together, though the circulation in the tail must be common to both. On the other hand the head alone may show signs of duplication. One young fish was found in whom this had extended only to the partial division of the

head. Of the four eyes, the two middle ones were not completely separated; they looked something like a figure of 8 on its side. Generally, one of the half fish is larger and stronger than the other, as seen in Fig. 2, and carries the smaller one off wherever it will,notwithstanding the apparent effort of the smaller one to go somewhere else.

These double fish are not very common, and as they die after the vitelline sac has been absorbed they are not seen by fishermen. The ratio of these deformed fish to the number of eggs in the hatching troughs was roughly estimated at twenty to twenty thousand, or one in a thousand eggs.

But a curious fact proved that the eggs of some fish contained a larger proportion. One large blind trout had a small pond to herself, and was fed daily by food presented to her on the end of a stick. Her eggs were kept apart,and out of about two thousand there were sixteen deformed fish, or one to one hundred and twenty-five eggs. Certain fish would seem to be more predisposed to produce eggs creating these monstrosities, and were we to ask for the cause of this,we should probably have to look for it in some anomaly of the ovary of the fish which produces the eggs.

A deformity more common than the double fish, is an apparent curvature of the spine. The fish, instead of being straight, with the umbilical vesicle under him, is curved round so that its tail turns under, and sometimes touches the under surface of the sac he is attached to. Fig. 3 represents one of these semi-circular fish. They are obliged to swim on their side, and move round and round in a circle, or in a spiral, without being able to go straight.


Fig. 3

These deformities are mentioned and treated by Buckland in his "Fish Hatching." He there suggests that humpbacked deformity may have been caused by pressure during their "transport in the egg state." In the instances mentioned above, however, there was no transportation, the ova being taken from the fish on the spot.

Out of two thousand salmon ova hatched at Messrs. Dexter & Co.'s fish farm, there were no deformities, but in another lot of about the same number there were two double-headed specimens just hatched out.—*American Naturalist.*

RESTORATION OF PERSONS APPARENTLY DEAD FROM DROWNING.

THE PHILOSOPHY OF THE TREATMENT.

As we promised, we herewith give the philosophy of the method prescribed by Dr. Benjamin Howard, published in our last issue:

Death from drowning is caused not because of the presence of water, as such, but because of the absence of fresh air from the chest.

Whether excluded by water, as in drowning; by a cord closing the windpipe, as in hanging; by dense smoke, as in a burning building; by foul gas, as in an old well, or from escape of ordinary burning gas into a close room; whether by burying the face in a soft pillow, or by a piece of tough meat lodged in the throat, corking up the entrance to the windpipe —in all these cases the immediate cause of death is one and the same.

The breath is the life. Let it be shut out from the chest, or anything else be entirely substituted for it, and *suffocation* at once begins, and this continued always ends in *death.*

To avert death, then, and re-awaken life in all these cases, you must not begin by giving a little stimulus, or "something reviving," as it is called; not by applying hot blankets, or putting the patient into a nice warm bed. The first and instant necessity is, if possible, to give breath until the patient is sufficiently recovered to be able to take breath for himself. This alone can start life again, and maintain it in action. If the draft and door of a stove is long kept tightly closed, the fire dies away to an interior spark. If in this condition you begin to put in more coal, your disturbance is very likely to completely extinguish the remaining spark.

To apply heat in any form to the outside around the stove would be simply absurd and ridiculous. If, on the contrary, you should open the draft,rake away the ashes and dead coals from the mouth of the draft up to the interior spark, open the damper and set a current of air in motion through the stove, or, in a great emergency, add a few gentle steady puffs from the bellows, you would be adopting what all experience proves to be the most sensible and only successful way to rekindle your fire to brightness and warmth.

The relation of fresh air to the burning of a fire is precisely what it is to the reviving and continuance of life. Therefore, if the friction, the breeze, and the slap upon the nerves over the stomach, as directed in Rule 1, fail to startle and revive the patient, then it is necessary to see at once that the track from the mouth to the chest is clear, so that the passage of air to the chest be not obstructed.

By following the directions of Rule 2, fluids accumulated in the stomach, chest, or throat, are removed. The stomach, at a greater elevation than any other part of the track, is pressed between the roll of clothing and the spine, whence water or other accumulations have a complete drainage down to and out of the mouth, which is the lowest point.

The next step is to induce air to enter the chest by what is called artificial breathing or respiration. Rule 3 prevents the tongue tumbling back into the throat, to choke it up as by a piece of dead meat, and provides for its tip being kept out and to one side of the mouth. Also by keeping the arms well stretched back, helps to keep the chest somewhat expanded.

The actual breathing is effected by the directions in Rule 4. In order to understand this, it must be remembered that the chest containing the elastic lungs is an open-work, ribbed, bony box, which above the bottom of the breast bone is scarcely movable, except by one's own will, the ribs being fastened both in front to the breast bone and behind to the spine. The ribs below the breast bone—known as the short ribs—are fastened only behind to the spine; they are very elastic and loose, and thus are called the floating ribs.

It is this enables any foolish woman to diminish the size of her waist to any standard fashion may demand.

All the breathing necessary to life can be performed by this part of the chest alone, as is generally the case during sleep.

When the pressure is made upon this part of the chest, then, as directed in Rule 4, the cavity of the chest is greatly diminished; what air is in it is partially forced out; and on suddenly letting go, the natural elasticity of these semi-cartilaginous ribs compels them to spring back to their natural position. This would create a vacuum, but that the fresh air is thus compelled to rush in through the mouth to occupy the otherwise vacant space.

This action, repeated as directed, compels successive volumes of fresh air to enter the chest just as occurs in natural breathing, and so it is called and constitutes "artificial breathing" or "artificial respiration."

The first returning natural gasps are apt to be irregular, and if the artificial breathing be continued regardless of them, the motions of the operator may actually interfere with and interrupt them: therefore, as directed in Rule 5, let your motions be so timed to the natural effort of the patient as simply to aid and deepen his breathing, which is as yet imperfect and insufficient.

With life comes heat, but the latter may be greatly favored by following the direction in Rule 6. Warmth, rest, and fresh air are now to be regarded as the important means of completing the resuscitation already begun.

These rules, except Rule 2, are equally applicable in apparent death from suffocation from any cause whatever, whether from hanging, chloroform, foul gases, or in still-birth. In the latter case, the lungs never having been expanded, it is better to combine forcible inflation by the mouth alternately with the forcible expiration by pressure.

To practice forcible inflation, the mouth being well cleared of mucus, close the nostrils with one hand while with the other you open the mouth widely by pressing upon the lower front teeth.

The larynx, known as "Adam's Apple," is gently pressed upon so as to prevent air passing behind it into the stomach; and then, having taken a very full breath, fit your lips to those of the patient, and blow with a steady force, nearly emptying your lungs at one effort; then compress as directed in regular alternation.

In death from either of the above-mentioned causes, the machinery of the human system is in no part damaged or broken; the engine has only ceased moving, the fires of life being put out.

It is this which allows a hope of resuscitation we cannot cherish in death from other causes. In some of these cases, so long does the vital spark linger after all signs of life have ceased, that recoveries are recorded from a few minutes to two or three hours after the patient, but for artificial respiration, would have been abandoned for burial. Since a few familiar lectures on the subject of resuscitation were given to some of the policemen of New York, the resuscitation of drowned persons by them has been frequently reported.

By an hour's practice upon a friend, any reader may acquire as much skill for such emergencies as a physician need possess, and at this small cost may perhaps obtain the life-long satisfaction of having restored one or more valuable lives otherwise irrecoverably lost.

How to Make Asphalt Walks.

Supposing that the walks are cut out, the bottoms filled up with rough ashes or other material to within about three inches of the desired level, rolled firm, and the edges of stone or box laid, commence to prepare the asphalt as follows: A clean space having been made near the large heap of sifted ashes, two men set to with shovels, by taking about two barrowfuls from the heap and spreading it in a circle, about three or four inches deep, a little to one side. The tar is then lifted out of the tubs with a long-handled ladle, and poured over the ashes until they have got just sufficient to soak them without any going to waste by draining away. Then, much in the same way as a mason's laborer mixes mortar, the ashes are turned quickly over once or twice, the better to soak them, and again laid a little to one side as the foundation of the heap. Another similar quantity of ashes is again drawn from the large heap, soaked and turned in the same manner, and thrown on the top of the first; and so on, until the whole is finished and thrown up in a conical heap. This is the first stage. The heap is now allowed to stand for about ten days, or longer if the walks are not ready. By that time the ashes will have absorbed the tar thoroughly, and will appear to be much drier than at first, when the same operation of turning the heap by small quantities at a time, and soaking with tar, is again repeated as before, the object being to add just sufficient tar to make the ashes "sticky" without making a puddle of them. The evil of too much tar is that the walks are soft, and the tar comes up to the surface in the rolling. For this reason it is better to leave the heap to drain for a week or so after the second turning also.

This much being accomplished and supposing all to have gone right, it will now be time to make the walks. Some fine morning, and when there is a prospect of the weather being dry for a day or two, all the barrows are put in action. Two men are set to fill, with strict injunctions to take the heap straight forward as it comes, as the ashes are always wettest in the center of the heap, and driest at the sides; and two are set to spread the asphalt on the walks as it arrives, about three inches deep, with iron rakes, using the back or teeth of the rake as may be needful, and taking care to have the walk slightly round in the middle. Putting on or spreading the asphalt does not take so long as might be imagined —six or eight men will cover one hundred yards of walk, six feet broad, in about three hours. After spreading, the walk is then rolled with a heavy roller, two men pulling it slowly along, and one going behind, sweeping the asphalt off with a besom as it sticks to the roller, whose duty it is also to wash the roller at the end of each journey. After being rolled for an hour or two until it is middling firm, the walk will be ready for sprinkling with the spar or gravel. Whatever material is used, it should be got ready beforehand. Derbyshire spar mixed with shale, gives the walks a clean, smart appearance; but common river gravel, put through a half inch sieve, would do well, and would give the appearance of a smoothly-rolled gravel walk. The spar is sprinkled on regularly with the hand, and just thick enough to hide the black surface of the asphalt, then rolled in with the roller until the walk is smooth and firm, when it is finished and fit for traffic. It should, however, be rolled for three or four mornings in succession, before the sun gets strong, in order to insure a firm "set."

The objections which have been urged against asphalt walks for gardens are that in hot weather the tar smells disagreeably, and that it is injurious to box-edgings and the roots of trees. As regards the smell, it soon almost disappears, and even in very hot weather it is never so perceptible as to be in the least disagreeable. Box does not thrive very well if it has not got established before the walks are asphalted; but when it becomes well rooted, it thrives as luxuriantly as could be desired. Stone edging, which is neat and substantial, resists the hardest frost, harbors no vermin, and saves much labor, is in every way superior to box for the kitchen-garden.

Mary Somerville.

One of the most remarkable women of the age is Mrs. Somerville. It is particularly appropriate to speak of her at this time, as she has just put forth a very able work upon Molecular and Microscopic Science, which is attracting much attention, both on account of its intrinsic merit, and the advanced age of its gifted authoress.

Mrs. Somerville was born at Jedburgh, in Scotland, about 1796. Her father was Vice-Admiral Sir William Fairfax. Her first husband was Samuel Gray, Esq., a man of considerable ability and acquirements, who taught her the elements of mathematics and the physical sciences. After his death she was married to William Somerville, M. D., of Edinburgh.

The successive steps by which she has gained distinction, are well enumerated in the following extract from the *Edinburgh Review* for July.

"The world is not unfrequently called upon to admire the keen interest and powerful grasp which veterans foremost in the ranks of science retain in their various pursuits up to the latest moments of an advanced age. It is, however, we believe, a case without a parallel in the annals of science that a lady in her eightieth year should publish a work containing a complete review of some of the most recent and abstruse researches of modern science, describing not only the discoveries in physics and chemistry, but especially the revelations of the microscope in the vegetable and animal worlds. Before many distinguished cultivators of the sciences she loves so well were born, Mrs. Somerville had taken a place among original investigators of nature, as in 1826 she presented to the Royal Society a paper on the magnetizing power of the more refrangible solar rays. This communication is printed in the 'Philosophical Transactions,' and led to much discussion on a difficult point of experimental inquiry, which was only set at rest some years later by the researches of Riess and Moser, two distinguished German electricians, in which the action upon the magnetic needle was shown not to have been caused by the violet rays. In 1832 she published her 'Mechanism of the Heavens,' and in 1834 she became still more widely known by the appearance of her 'Connection of the Physical Sciences,' and the 'Physical Geography.' These works have passed through many editions, and have been translated into several foreign languages; whilst in this country her services to geographical science have been recognized by the award of the Victoria medal for 1869 of the Royal Geographical Society. In her work on 'Molecular and Microscopic Science,' the gift of lucid description, so characteristic of the distinguished authoress of the 'Connection of the Physical Sciences,' is as conspicuous as ever; but that which most forcibly strikes the reader of these pages is the extraordinary power of mental assimilation of scientific facts and theories which Mrs. Somerville displays."

Japanese Art.

The experience of the last few years during which the long-closed gates of the Japanese Empire have been open to us, has naturally enlarged our knowledge as to that peculiar people.

Resembling, as might be expected, the products of the neighboring country of China, the fabrics of Japan are, however, far superior to those of the Flowery Land, and this not only in mechanical execution, but in freedom of design and fertility of invention. The works of the Japanese workman, particularly if regarded in an artistic point of view, display an energy of individual thought strangely contrasting with the conventional uniformity, the mental paralysis which, possibly resulting from political causes, has ever since the earliest date of modern history afflicted the wonderful people to whom may undoubtedly be ascribed the invention of

several of the mightiest, the most essential aids to civilization.

This superiority of the Japanese is, as may be expected, more clearly visible in the representation of living figures, and particularly of the human form. Nothing can offer a more vivid contrast than the egg-shaped simpering faces, the entire absence of anatomy so long familiar to us on Chinese fans or porcelain, when compared with the vigorous muscular developments, the expressive countenances, and the ever-present sense of fun which pervades even the common picture-books of Japan. Printed and colored by blocks, and obviously very cheap, their amount of artistic power is truly remarkable, and the Japanese schoolboy has needed no Felix Summerly to stand up for his rights to be nourished on good mental food so far as relates to art. It must be admitted that decorum might at times be better guarded. These cheap books are mostly pervaded by a spirit of cariacature, tending, as by its nature cariacature must, to exaggeration. But the Japanese artist can, if he will, confine himself within strict academic limits without thereby sacrificing force.

A class of ornaments peculiar to these islands may, from their small size, have met with less attention from the ordinary visitor than their merits deserve. We allude to the small steel or bronze carvings which the Japanese wear at their girdles, which—to use the language of the seafaring—have a ribbon rove through them to support a tobacco-box, much like the watch, chain, and seals of the past generation. Some of these will repay close examination. Small in size, for they are rarely larger than an almond shell, they contain but one or two figures, a captive in his dungeon, or a huntsman stabbing a boar, but of singular vividness and breadth of execution.

We have in recollection at this moment, a wizard "so lean his eyes were monstrous, while the skin clung but to crate and basket, ribs and spine," that might have sat to the laureate for his life-like word portrait of Merlin's brother enchanter. Hitherto, however, all the specimens of Japanese art which have reached England have been ordinary marketable commodities, procurable by any one with a moderate command of ready cash, and it is with much interest that we can now contemplate a specimen of what they themselves regard as an individual specimen of high art. Dr. A. Barton has lent to the South Kensington Museum, England, a painting well known to the critical community of Japan, and which indeed—so we are informed—had to be brought away with some precautions to avoid the risk of a governmental embargo. The picture is in water color on silk, or possibly the admixture of silk and paper peculiar to that country, and represents a tiger, life-size, or to speak with strict accuracy, of the size of a leopard, though the colors are those of the huge tiger of Bengal. The animal is in a singularly bold position, giving ample play to the skill of the artist in foreshortening. The body clings to a huge rock, the hind leg appearing on one side, the fore leg on the other, while the chief mass of fur appears above the top of the stone. The creature is gazing at an unseen foe, the eyes fiercely expressive, the formidable jaws open, and the skin flattened over the skull, in the manner any one may observe in the common cat when excited by fear or rage. The most wonderful point in this very curious picture is the manner in which the fur is painted. Each particular hair seems to stand on end, and so accurately are brought out the spiral radiations of separate hairs from a central nucleus that more than one observer has been convinced that they had before them an actual skin and not a pictorial representation. This error is the more easy to fall into, as the chief defect in this marvelously vivid imitation is its want of shadow. This, the common fault in Oriental paintings, causes the limbs to lie flat against the rock and spoils what would otherwise be an almost complete deception. The accessories of the picture, a waterfall, and mossy stones, are dashed in with a singularly bold carelessness which, to speak truly, renders it somewhat difficult to decide what the painter meant by his conventional dabs and smears.

What Are Brittleworts?

The Diatomaceæ, or Brittleworts, are unicellular microscopic plants, so numerous that there is hardly a spot on the face of the earth, from Spitzbergen to Victoria Land, where they may not be found. They abound in the ocean, in still running fresh water, and even on the surface of the bare ground.

They extend in latitude beyond the limits of all other plants, and can endure extremes of temperature, being able to exist in thermal springs, and in the pancake ice in the south polar latitudes. Though much too small to be visible to the naked eye, they occur in such countless myriads as to stain the berg and pancake ice wherever they are washed by the swell of the sea; and when inclosed in the congealing surface of the water, they impart to the brash and the pancake ice a pale ocherous color.

Some species of diatoms are so universal that they are found in every region of the globe; others are local, but the same species does not inhabit both fresh and salt water, though some are found in brackish pools. The ocean teems with them. Though invisible as individuals to the naked eye, the living masses of the pelagic diatoms form colored fringes on larger plants, and cover stones and rocks in cushion-like tufts; they spread over the surface as delicate velvet, in filamental strata on the sand, or mixed with the scum of living or decayed vegetable matter, floating on the surface of the sea; and they exist in immense profusion in the open ocean as free forms. The numbers in which they exist in all latitudes, at all seasons, and at all depths—extending from an inch to the lowest limit to which the most attenuated ray of light can penetrate, or at which the pressure permits—are immeasureably in excess of what we have been in the habit of assuming. Temperature has little to do with the distribution of diatoms in the tropics; it decreases with the depth at a tolerably fixed rate, till it becomes stationary. It increases in the polar regions with the depth, and approaches the standard, which is probably universal, near the bed of the ocean.

Diatoms are social plants crowded together in vast multitudes. Dr. Wallich met with an enormous assemblage of a filamental species of Rhizosclenia, which is from six to twenty times as long as it is broad, aggregated in tufted yellow masses, which covered the sea to the depth of some feet, and extended with little interruption throughout six degrees of longitude in the Indian Ocean. They were mixed with glistening yellow cylindrical species of such comparatively gigantic size as to be visible to the naked eye.

Other genera constitute the only vegetation in the high latitudes of the Antarctic Ocean. Dr. Hooker observes that without the universal diffusion of diatoms in the south polar ocean, there would neither be food for the aquatic animals, nor would the water be purified from the carbonic acid which animal respiration and the decomposition of matter produce. These small plants afford an abundant supply of food to the hervivorous Mollusca and other inhabitants of the sea, for they have been found in the stomachs of oysters, whelks, crabs, lobsters, scallops, etc. Even the Noctiluci, those luminous specks that make the wake of a boat shine like silver in a warm summer night, live on the floating pelagic diatoms, and countless myriads are devoured by the enormous shoals of Salpi, and other social marine animals.—*Mrs. Somerville.*

Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

Improvement in Construction of Smelting Furnaces.

MESSRS. EDITORS:—As a reader of your excellent journal I have been much interested in the various articles published on the manufacture of iron, steel, etc.

My object in writing to you is to call attention to the manufacture of pig iron, and to get information and suggestions. I believe there is yet much improvement to be made, but not altogether in the direction now generally pursued.

If I am right, the principal improvements of late consists in building the stack much higher than formerly, in order to utilize the heat and more thoroughly prepare the stock for melting; second, to greatly increase the temperature of the blast, in order to perfect the melting when the stock arrives at the proper point, or "bone," as I believe it is called.

I have been engaged in melting iron in a cupola for a number of years, and for the past two years have changed the construction of the inner walls of the cupola and tweers, and for the past twelve months have accomplished much in utilizing the heat, and have consequently made a large saving of fuel. We use ninety graduated tweers in a cupola 36 in. in diameter. This arrangement thoroughly distributes the blast through the coke in place of chilling it, as it does in the ordinary way.

I am not aware that this plan has been tried in a blast furnace, although various patents have been granted. No patent, however, has been allowed for this specific arrangement or thing like it. If it could be used, and the same result attained in the manufacture of pig iron it would be a very important advance in the right direction. It is the opinion of practical men that it can be, and the hot blast dispensed with, but with the hot blast perhaps better results would be obtained.

I send the result of one day's work, and although it is somewhat better than the average year's work, it is not materially so.

COKE.		IRON.	
No. of charges.	Total.	No. of charges.	Total.
1 or bed	1,400	1	5,000
2 of 120 lbs. each	240	2 of 1,000 lbs. each	2,000
19 of 100 lbs. each	1,900	19 of 1,000 lbs. each	19,000
6 of 80 lbs. each	480	6 of 1,000 lbs. each	6,000
	4,020		32,000
Coke returned not burned	875	Iron returned not melted	462
Coke actually burned	3,145	Iron actually melted	31,538

One pound of coke melted ten pounds of iron. Loss in melting, two per cent.

Amount of limestone charged per tun, 50 pounds.
Size of cupola across the tweers, 36 inches.
Size of cupola above the tweers, 48 inches.
Hight to charge hole, 13 feet.
Two cylinders, each 36 inches in diameter, 30-in. stroke.
No. of revolutions per minute, 60.
Cubic feet of air per minute, 4,241.
Time in melting, 1 hour and 40 minutes.

Cincinnati, Ohio. R.

A Recommendation to "Many Farmers."

MESSRS. EDITORS:—In a recent issue of the SCIENTIFIC AMERICAN, my attention was drawn to the request of "Many Farmers," for an invention that would enable them to utilize waters running through their lands to waste while their corn crop is suffering by drought. To my mind it seems that if "Many Farmers" would club together and purchase one of the steam engines now in use to extinguish fires, they might draw the water from a considerable distance and throw showers over their fields at pleasure. These machines are portable and readily conveyed from one distant point to another, and if expensive at first, their utility would soon cover the cost, and the annual interest on the sum invested would be less than ditching, or pipes, etc.

In the same issue a substitute is wanted for the present cruel "method of branding cattle." It occurred to me that a chemical compound could be employed; say, Quicklime, 1 oz. ounce; niter, ¼ ounce; orpiment, 3 drachms; sulphur 1 drachm; soap lees, 4 ounces, mixed and evaporated to a proper consistence to print with, or lime and water mixed to a thick cream, and passing through the mixture 25 or 30 times its volume of sulphureted hydrogen gas till the gas begins to escape, then stop the process. This pulpy mass laid on the hair for 12 or 15 minutes, then washed off with a sponge, will remove the hair as well as burning. The rain might do the washing off.

Perhaps this may suggest to your own prolific minds a still better compound. J. STAUFFER.

Lancaster, Pa.

The Premium Offered on a Time and Percussion Fuse by the Swiss Government.

MESSRS. EDITORS:—The Swiss Government, according to statements made in the Swiss newspapers, offers a premium of £2,000 in gold for the best time and percussion fuse for shells, and names Oct. 1st, 1869, when models are to be presented to the military department at Berne.

Inventors would like to know—First, is the notice official? Second, are inventors of all nations invited to compete? Third, is it not a time and concussion fuse that is desired? Fourth, is the fuse to be attached to the shell and fired? Fifth, what kind of rifle shell is used?—Is it on the button system, which allows windage and ignites the fuse without a fulminate, or is the sabot of such construction as to cut off all windage and thereby require a fulminate to light the fuze?

Any official facts published in your paper relating to the above would much oblige inventors in this country.

Washington, D. C. THOMAS TAYLOR.

[We have not seen the notice referred to and cannot answer the inquiries made. Perhaps some of our correspondents may be able to give the desired information.—EDS.

Editorial Summary.

MOUNTING small insects for the microscope, such as parasites and acari from birds, beetles, etc., may be performed by placing the live insect on the inside of a sheet of tolerably good note paper, folded, and when in the act of running, closing the paper and pressing it tightly in a book. By this means the legs and antennæ may be nicely extended, all the expressed moisture absorbed by the paper, and the skin left apparently unbroken. It should be allowed to remain in the book about two days, when it may be carefully removed from the paper, put in the turpentine bath, and afterward mounted in balsam in the usual way.

TURPENTINE AS A REMEDY FOR LOCKJAW.—The *Medical and Surgical Reporter* notices the communication of one of our correspondents in regard to turpentine as a remedy for lockjaw. It says it is one of the numerous remedies long known to physicians, and that its efficacy cannot be relied upon with certainty. The fact is that lockjaw is one of the most obstinate complaints physicians are called upon to treat, and no remedy has been yet found which certainly masters it. The Calabar bean has been lately tried with considerable success, administered hypodermically. This remedy is not, however, a new one, and has failed in many instances.

WE hope no reader will fail to peruse the article entitled "Patents or No Patents," published in another column. They will find therein much that is instructive as well as amusing, and will become convinced of three facts: First, that English workingmen are not such asses as Sir Roundell Palmer and Mr. Mcfie evidently took them to be; second, that the patent laws of that country are not likely to be repealed; and, third, that the American patent laws are, as a whole, superior to those of England, if not to those of any other country on the face of the earth.

THE poor children of Philadelphia, says the *Ledger*, are largely interested in the peach kernel trade. They extract the kernels from the "stone," put them upon strings, or threads, in bunches numbering from one to five hundred, and sell them to the druggists. The price is one cent a hundred, and an industrious gleaner might, possibly, collect, crack, and string 500 in a day; so that those urchins in the trade are not likely to be called on to pay income tax. The kernels are used, principally, for making alcoholic "bitters," and are chiefly valuable for the hydrocianic acid to be procured from them.

KENNEDY'S PATENT SADIRON.—The inventor of the sadiron, illustrated and described on page 116, current volume, desires us to state that the bracket and pulley arrangement for taking up the slack in the flexible gas tube, is only necessary on very large work. For ordinary domestic use it may be dispensed with, the simple flexible tube of the proper length affording ample play for the iron.

"COSMOS" says that while some drainage works were being executed at Vielsalm, province of Liege, Belgium, the workmen found, at no great depth under the surface, a piece of native copper, weighing about four and a half pounds, and partly hollow inside exhibiting crystals. This discovery led to some further research, which resulted in finding some veins of malachite.

Unless glass is carefully annealed and thoroughly well made it is apt to cool unevenly; this does not affect the transparency or its appearance, but is discoverable on examination by polarized light.

STEREOTYPING by the paper-machié process was invented by Genaux, of Paris, in 1829.

Improved Machine for Boring and Mortising Blind Stiles.

This machine, as illustrated in the accompanying engraving, embraces all the features of the machine for which a patent was granted to Leonard Worcester, July 5, 1859, together with several other valuable improvements for which a patent is now pending, and which, it is claimed, render it the most efficient machine for the kind of work it is designed to execute on all kinds of stock now manufactured.

Machines have been made for some time that would mortise soft lumber free of knots and shakes, but none before this have had the necessary combination for both boring for revolving slats, or mortising for fixed slats, in all kinds of stock, hard or soft, clean stock or knotty and shaky timber, and for leaving the mortises free from chips ready for the insertion of the slats.

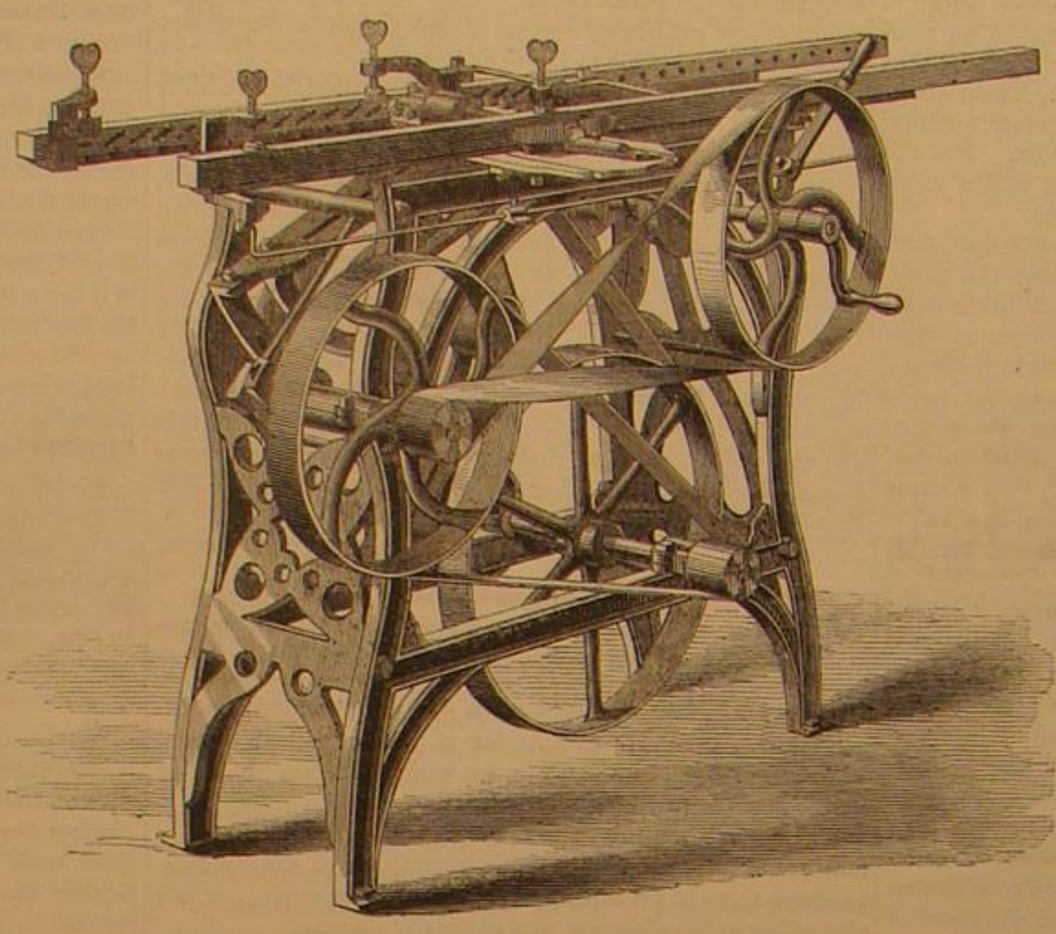
This machine is entirely automatic in its operations, either boring round holes for the pivots of revolving slats, or mortising the recesses for the ends of fixed slats. In cutting these recesses it can be adjusted to make them at any required angle. The cutting of the recesses is done by means of a reciprocatory or traversing burr or bit, which, we have already said, can be used in any obstinate description of wood, where ordinary machine chisels fail. It will also make the mortises any length from a round hole up to two and one half inches, and of any width or depth required in a window blind.

All the operator has to do is to put in the stiles and set the machine in motion, when it does its work, and, having done it, stops. It does the work on both stiles at once at the rate of sixty mortises per minute. One man, the inventor asserts, can set out and mortise from 125 to 150 pairs of blinds per day with one machine.

The bit or burr is a very simple device, not liable to be broken and easily kept sharp. It costs only ten cents.

The machine is very simple in construction and is made wholly of iron and steel. It is thoroughly built and easily set up and put in operation, and is not liable to get out oforder. Not more than one half a horse power is required to run it.

It is peculiarly adapted to the work on car blinds, where the mortises are less than one eighth inch in width, and, consequently, difficult to make with chisels of ordinary construction. Agents for its introduction throughout the United States are wanted. For further particulars address Martin Buck, agent, Lebanon, N. H.



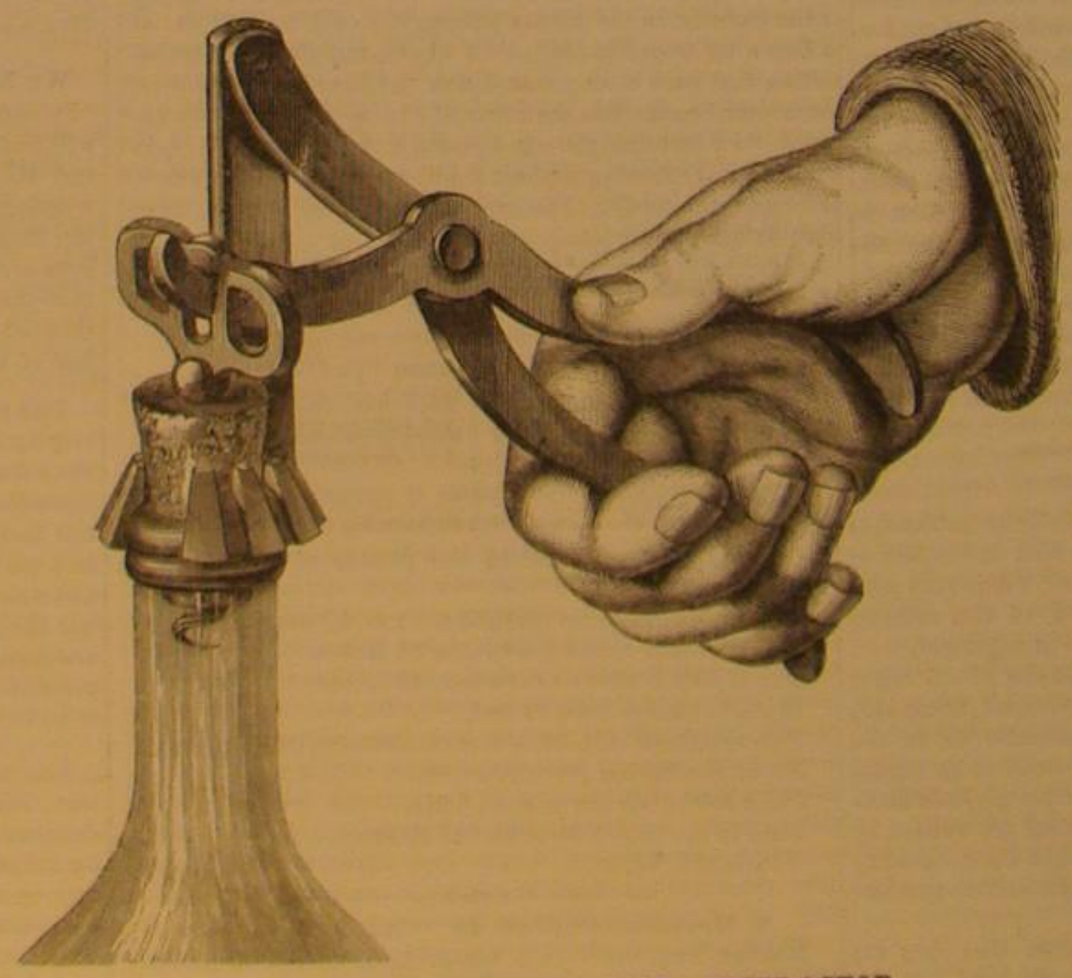
BLIND STILE BORING AND MORTISING MACHINE.

Improved Cork Extractor.

Our engraving shows a simple and powerful implement for extracting corks from bottles, patented Jan. 14, 1868, by James Morton, of Philadelphia. It consists of three bars pivoted together, which, together with the corkscrew, constitute the entire apparatus. One of the bars has a socket or cap at its lower end, which is placed on and around the nose of the bottle. Near the upper end of this first post or bar is pivoted the end of the second bar, near the middle of which the third bar is pivoted. The second and third bars have handles at their outer ends, and at the inner end of the third bar is a hook.

This hook engages with the corkscrew in the manner delineated in the engraving, and by forcing the handles together or pressing them downward, the cork can be easily extracted. The instrument is equally adapted to extracting corks on which rings or hooks are already formed so that no corkscrew is needed.

For further particulars address James Morton, 912 South Eighth street, Philadelphia, Pa.



MORTON'S DOUBLE-LEVER CORK EXTRACTOR.

A Deserved Testimonial.

A few days since Moses G. Farmer, Esq., of Salem, Mass., was presented with a sardius, or red carnelian intaglio, of Sir Isaac Newton, estimated to be about 200 years old, by S. W. Dewey, of this city, in consideration of his electrical investigations and inventions. This latter gentleman, in presenting it, stated that since being its proprietor he had often thought he would present it to Professor Morse, in token of the great good he had conferred upon the human family by his telegraph inventions, but lately he had become convinced that Mr. Farmer, the inventor of the fire-alarm telegraph and the American compound telegraph wire, was eminently deserving of it. Mr. Dewey received the intaglio from a Mr. Bishop, late of New York, who received it from his father, who was a diamond setter to the sovereigns of England, France, Spain, and Portugal, and the records held by him of the jewels he had in his possession were such as to leave no doubt as to the antiquity of the gift and the probability that it was taken from life.—*Boston Traveler.*

Professor Tyndall.

The following agreeable personal sketch of Prof. Tyndall, by a correspondent of the New York *Tribune*, will be perused with interest by our readers who have so often seen his name in these pages:

"One of the most agreeable features of my brief visit in London was the acquaintance, which, through the kindness of friends at home, I was enabled to make with several eminent scientific men whose names are cherished with equal honor on both sides of the Atlantic. Soon after my arrival I called on Prof. Tyndall at his rooms in the Royal Institution, a learned society, which, from the commencement of the present century, has exerted a marked influence on the development and popular diffusion of scientific knowledge in England. Its history is illustrated by some of the most important discoveries of the age in the natural sciences, including the labors of Count Rumford, Sir Humphry Davy, Faraday, and Prof. Tyndall himself, whose enthusiastic, poetical temperament and remarkable gifts of expression, combined with the habit of rigid scientific analysis, have contributed largely to create and gratify the taste for popular science, which prevails among a very considerable portion of the cultivated classes in English society.

"Prof. Tyndall has all the ardor of a reformer, without any tendency to vague and rash speculations. Recognizing whatever is valuable in the researches of a former age, he extends a gracious hospitality to new suggestions. With a noble pride in his favorite branches of inquiry, he is not restricted to an exclusive range of research, but extends his intellectual vision over a wide field of observation. The English, as a rule, are inclined to be suspicious of a man who ventures beyond a special walk in the pursuit of knowledge. They have but little sympathy with the catholic taste, which embraces a variety of objects, and is equally at home in the researches of science, the speculations of philosophy, the delights of poetry, and the graces of elegant literature. But a signal exception to this trait is presented by Prof. Tyndall. His mind is singularly comprehensive in its tendencies, and betrays a versatility of aptitude, and a reach of cultivation, which are rarely found in union with conspicuous eminence in purely scientific pursuits. In his own special domain, his reputation is fixed. His expositions of the theory of heat and light and sound, and of some of the more interesting Alpine phenomena, are acknowledged to be master pieces of popular statement, to which few parallels can be found in the records of modern science. But in addition to this he possesses a rare power of eloquence, and manifold attainments in different departments of learning. I do not know that he has ever written poetry, but he is certainly a poet in the fire of his imagination, and in his love for all the forms of natural beauty. Nor has he disdained to make himself familiar with the leading metaphysical theories of the past age, in spite of the disrepute and comparative obscurity into which that science has been thrown by the brilliant achievements of physical research. I noticed with pleasure in his conversation his allusions to Fichte, Gœthe, R. W. Emerson, Henry Heine, and other superior lights of the literary world, showing an appreciation of their writings, which could only have been the fruit of familiar personal studies. Besides the impression produced on a stranger by his genius and learning, I may be permitted to say, that I have met with few men of more attractive manners. His mental activity gives an air of intensity to his expression, though without a trace of vehemence, or an eager passion for utterance. In his movements he is singularly alert, gliding through the streets with the rapidity and noiselessness of an arrow, paying little attention to external objects, and if you are his companion, requiring on your part, a nimble step and a watchful eye not to lose sight of him.

"Though overflowing with thought, which streams from his brain, as from a capacious reservoir, while his words 'trip around as airy servitors,' he is one of the best of listeners, never assuming an undue share of the talk, and lending an attentive and patient ear to the common currency of conversation, without demanding of men the language of the gods. The singular kindness of his bearing, I am sure, must proceed from a kind and generous heart. With no pretense of sympathy, and no uncalled-for demonstrations of interest, his name will certainly be set down by the recording angel, as 'one who loves his fellow-men.'"

Prof. Horsford's Method for Making Bread.

In a recent letter from one of our correspondents, it was asserted that Prof. A. J. Bellows had charged that the preparation for raising bread, patented by Prof. Horsford, was poisonous in its nature, that it was simply phosphorus disorganized, whatever that may mean, and as such, as dangerous as any other poison, etc., etc.

To this statement, which we published without comment we say that after taking time to consider the possibility of the occurrence of free phosphorus during any stage of the process from the bones to the bread, we see no room for admitting any such possibility on chemical grounds.

Second, we have eaten of bread, pastry, etc., prepared by this method, for months and do not find ourselves poisoned so far as we are able to discern.

Third, the testimony of many eminent chemists, among whom Liebig stands first as undoubted authority on a question of this kind, not only declares it harmless, but beneficial to health. And we have no hesitation in saying that all statements to the contrary have no scientific or practical foundation, and they could not be made by a scientific chemist, who, in addition to learning, possessed that other essential of reliable judgment—candor.

Do Animals Think?

We have been asked to give our opinion upon this subject which has been recently debated in Tennessee. There has been no doubt in the minds of many eminent thinkers and observers that animals think and reason. We fully coincide in this belief, and think that a careful examination of their habits and acts will convince any candid observer that they are not wholly, although doubtless to a great extent, governed by instinct. Those to whom our columns are familiar will recollect a number of articles containing facts which go to prove the reasoning power of animals.

The Board of Trade of St. Louis has appointed a committee of twelve to raise by subscription $120,000 to build an iron sea-going propeller to inaugurate direct trade between St. Louis and foreign ports. The vessel will be of 1,000 tuns capacity, and will not draw over six feet when light.

It is stated that one hour after the gas of London is lighted the air is deoxidized as much as if 500,000 people had been added to the population.

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WHAT KEEPS SOLID BODIES HEAVIER THAN WATER SUSPENDED IN A RUNNING STREAM?

The question here propounded is one of more practical importance than at first sight it may appear. As the sole object in increasing the velocity of the flow of water in rivers by means of dikes and other appliances is to enable the water to keep suspended, or, not to beg the question, to enable the solid matters to remain suspended in the water, so that they will not deposit in the form of bars, it becomes important to be able to ascertain the precise amount of narrowing and straightening that will secure the desired velocity; and the question with which we have headed this article is certainly important in deciding the question of velocity.

To use the words of an able cotemporary, *Engineering*, in an article entitled "Fluvial Abrasion," contained in its issue of June 25th, "Velocity alone is needed to convert half a gallon of shot and half a gallon of water into a plumbeous porridge; indeed, lead, or anything, however heavy, will swim in water if the water only runs sufficiently fast."

Engineering goes on to criticise the views of one of its correspondents in regard to this subject, but in our opinion it makes one rather serious mistake, especially as in the article referred to it assumes the *rôle* of "philosopher," which it plainly tells its correspondent he is not, although an "able and conscientious engineer." It says, "Mr. Login arrives at what we think must be an erroneous conclusion in deducing from various premises that a certain amount of the energy of running water is absorbed or expended in carrying with it solid matter in suspension. In first putting this matter into motion, power is unquestionably abstracted from the water; but as soon as uniform flow is established the solid matter flows in obedience to its own gravitation, neither receiving from nor imparting to the water any power whatever.

"Its tendency to continue its onward motion is sufficient to overcome gravitation, and as it moves with water of its own velocity, it is in equilibrium 'fore and aft,' and thus it moves on with no resistance whatever, unless it be argued that its rate of advance is less than that of the stream. If so, it would drop at once, and the conditions of flow would cease."

If this be philosophy, or if the assumption that uniform flow can be at some time fully established be not begging the question, then have we much left to learn in the elements of physics and logic.

Let us examine this singular proposition in the light of the following well-known and admitted natural laws.

1st. If two or more forces act upon a body at the same time each of these forces produces the same effect as if it acted alone.

2d. The quantity of motion imparted to a body by a constant force is in proportion to the time of the application of the force.

3d. If two forces act simultaneously upon a body in different directions not opposite, it will move in the direction of neither, but in a line between them.

A bed of a river is an inclined plane down which the particles of water roll. If it were perfectly smooth there would be no friction and consequently no wear of the bottom, but as the bottoms of all streams are more or less rough, the projections receive the force of the descending water, and, if the current be strong enough, are forced from their beds and either rolled along the bottom, or, if the impetus is strong enough, are carried out on a line nearly parallel to the base of the inclined plane into the stream. When this has taken place gravity acts upon the body, not in a line parallel to the inclined plane, but in a line perpendicular to its base, which tends to draw the body down to the surface of the inclined plane again by a *constant force* equal to the difference between the weight of the solid floating body heavier than water, and the weight of an equal bulk of water. What counteracts this tendency during any period of time if not the motion of the water? And as the overcoming of the action of a constant force implies a constant exertion of some other force, how are we to escape the conclusion that a constant demand is made upon the momentum of the flowing water to keep stones or sand supported in a current?

The motion of the water obeys the same laws as those of other bodies rolling down an inclined plane; water being practically homogeneous, no part of it seeks by its own gravity to regain the surface of the plane. But a stone carried along by the force of a stream is constantly making this effort. Something prevents it and that something can be nothing else than the water. If stones, or sand and water, were flowing downward by the force of gravity alone in a vertical line, all would move together (not taking into account resistance of the air) at equal velocities for the same points in the line of descent. But in no other case could this occur. As soon as the stream is inclined the heavier body begins to seek the bottom of the channel, and is only prevented from reaching it by absorbing motion from water flowing *more rapidly in a line parallel to the bottom.*

Thus the stone may be said to receive, the moment it attempts to move toward the bottom, an infinite number of kicks from the particles of water which it must check in their flow in order to reach the bottom. It is the game of football repeated; the ball is kept flying, but it takes power to do it.

We have intimated that the speed of solid matters heavier than water must of necessity flow less rapidly in a line parallel to the bottom of the channel than the water which floats them. Many have witnessed the butterfly trick performed by the Japanese jugglers in their exhibitions in this country. It illustrates this truth exactly. Pieces of colored tissue paper are folded to represent butterflies, which, by means of currents of air adroitly produced by fans, are made to float or alight and appear to sustain themselves at the will of the performer. It is a very ingenious and amusing feat, but the same principle is involved in it as in the "plumbeous porridge" of *Engineering*. The heavier bodies are only sustained by the momentum of the more rapidly flowing light fluid.

Again what is the "tendency to continue its onward motion" which *Engineering* says is sufficient to overcome gravity but an impulse received from the water. But admitting for the sake of argument that it has such a tendency in and of itself (its inertia perhaps is meant), the direction of such a force would be in a line parallel to the bottom. On what new principle of physics is it asserted that a force acting at nearly a right angle to the force of gravity will counteract gravity? A proposition at once so entirely void of any foundation in the laws of force and motion, and so feebly sustained by argument will surprise the readers and admirers of our esteemed and usually accurate cotemporary. Does it not also tacitly admit its error when it says that "anything, however heavy, will swim in water if it only runs *sufficiently fast*. Is this not equivalent to saying the heavier the body the greater the velocity in the stream needed, not only to start it, but to *keep it up after it starts*? And what ground is there for asserting that such a body would sink "at once" should its velocity ever become less than that of the water? Let *Engineering* tie a cast-iron plate to a string and then throw it upon a very rapidly flowing stream, holding on tight to the string, and report the result. The experiment will be nothing more than flying a water kite.

ORNAMENTAL PAINTING OF BUILDINGS.

Why it is that the American people run so much to the somber colors in the painting of houses and outbuildings, is an æsthetical question we leave for others to discuss. The general lack of taste generally displayed in the selection of tints is, however, only too palpable. One has only to take a ramble through one of our cities to demonstrate this fact. Rows upon rows of dull and dismal looking dwellings may be met with, painted dark-brown or a dirty-looking drab, with blinds of a color suggestive of nothing but mud.

The combinations of color frequently met with are positively hideous. There is a drab colored house which we are obliged to pass frequently, with sky-blue window casings and blinds, and a sort of balcony in front with an utterly unheard of color, one might suppose to have been compounded of all the pigments scraped from the bottoms of the pots in some painter's establishment for a year, ground together into a dauby, dingy hue altogether indescribable. This house is enough to throw a man of good taste into spasms of disgust. Nor is it a solitary instance except in the depth of depravity to which the taste of its would-be decorator has sunk.

Summer relieves the eye somewhat when its soft green covers the earth, but when winter comes these abortions of color stand out in revolting deformity. Here is a frame house which the painter has attempted to make look like a brownstone, and in doing so has made it look like a prison house of woe. There is what would have been a pretty little cottage if it had not been spoiled by Spanish brown. Back of it stands a carriage house of a leaden blue color. Yonder is a large mansion of brown stone, stately in its proportions and with a well designed front, the effect of which is spoiled by interior blinds with white frames and yellow slats.

In rural districts these defects are carried still further, so far as outside work is concerned, while the inside work is for the most part left bare and plain. Where any attempt at decoration is made, however, neutral tints without meaning are generally employed.

Nothing like attention to a general tone, and no reference whatever to the colors of carpets or furniture, is to be discovered in ninety-nine cases out of a hundred. All is a mass of incongruity from beginning to end.

The grossness of the fault being admitted, to what is it chargeable? In part to the bad taste of people at large, but most to the imperfect knowledge of painters, who, as a class, are sadly deficient in the knowledge of harmony in color, and whose instruction is mainly confined to grinding colors and manipulation of the brush.

If house painters could only be made to realize the value of the study of color, and to understand that the really great in the art are so chiefly because of their superior knowledge in this respect, improvement might be expected. There is no longer any excuse for ignorance. The researches and works of Chevreul, and others, have provided the necessary means whereby any intelligent painter may obtain the proper instruction.

Much doubtless depends upon natural talent in this as in other arts; but still we feel justified in asserting that in this country, at least, the house painters are far more deficient in the knowledge necessary to a high degree of skill than mechanics in other occupations. We do not suppose all house painters will become artists even with the knowledge which all ought to possess, but it is certain that no one will ever perform superior work without it.

LABOR-SAVING MACHINERY AND CO-OPERATIVE LABOR.

The value of labor-saving machinery is a subject which we have often discussed in these columns, and we should not now return to it were it not that we sometimes meet the assertion, that the extended use of labor-saving machinery has created a disability on the part of labor to compete with capital. We cannot suppose any one in this enlightened age will claim that anything calculated to constantly put power into the hands of one class, at the expense of another, not to say a very much larger class, could ultimately lead to anything but tyranny on the one hand, and abject servitude on the other.

The condition of labor, at the present time, is, we maintain, better, on the whole, than at any previous time in the history of the world. Slavery and serfdom are nearly extinct throughout the civilized world, and if wages be estimated, not in dollars, but in comforts of life received as the reward of industry, they are higher now than at any previous period. Of course, we do not, in this statement, take into account any temporary difference which might be found upon comparing the prices of to-day with ruling prices existing a few years since. What we wish to make plain is, that if a mean be struck, from the commencement of the Christian era to the present time, it will be found that labor has made much greater progress than capital. It will further be found, that the most progress has been made since the introduction of labor-saving machinery, and we assert, that such machinery has been a propelling power, not a resistance to be overcome in this progress.

The peculiarity of the effect of labor-saving machinery, of greatest importance in a social point of view, as affecting the status of classes, is the local concentration of labor, at the same time that it subdivides it into departments. Few manufactures now exist in which more than a part of the article produced is made by a single operative. In the majority of cases, the thing made passes through many hands before its completion. In order that the one article thus manufactured by the help of many workers can be made economically, it is necessary that the workmen should be brought together. This coming together is an element of social power which labor did not possess before the introduction of labor-saving machinery.

The result is association to protect mutual interests, and capital has latterly found it a very difficult matter to usurp undue authority since these associations have fully developed their power. It has enough to do to hold its own.

Labor-saving machinery is the only thing that renders co-operation possible in the mechanic arts. This kind of organization is yet destined to play an important part in the history of civilization.

If these facts are true, and we think them indisputable, labor has not suffered disability, but, on the contrary, has derived increased power to compete with capital from the use of labor-saving machinery, and those who think otherwise base their opinions, we think, upon a too narrow view of the subject.

ELECTRO-PLATING AND GILDING.

Every year adds to the general demand for electro-plated goods, and the experience necessary to produce them in the most perfect manner. The manufacture is based upon what has received the scientific name of electrolysis, that is, the decomposition of compound substances by means of the electric current. The current may be generated, either mechanically, with the ordinary friction machines, or chemically, as in the various galvanic batteries in use. The substance thus capable of being decomposed is called an electrolyte. Every electrolyte contains two or more elements which may be divided into two groups: those which are attracted to the positive pole of the battery, and those which go to the negative pole. These two groups are called *ions*, and those which move to the positive pole are called *anions*, while those which move to the negative pole are called *cations*.

To illustrate this, suppose the substance to be decomposed is sulphate of copper, in solution, and an electric current to be passed through it. Sulphate of copper is composed of copper and sulphuric acid, the latter of which is composed of sulphur and oxygen. Copper is a cation, hence it will move to the negative pole of the battery. Both sulphur and oxygen

are anions, hence, the acid which the union of these substances forms will move to the positive pole without decomposition, as would be the case were either sulphur or oxygen a cation. The terms *ion*, *anion*, and *cation*, were first suggested by Faraday. The first is derived from a Greek word, to go, and anion signifies, literally, that which goes upward, while cation signifies that which goes down. These terms are applied to indicate the opposite directions in which substances move when their union is broken up by electrolysis, a word which, literally, signifies to loosen by electricity.

The laws which govern electrolysis are very simple. Bodies, with few exceptions, are only decomposed while in the liquid state, brought about, either by fusion or solution. No elementary substance can, from the nature of the case, be an electrolyte. The direction of the electrolysis depends upon the arrangement of the battery and the amount of it is directly proportional to the quantity of electricity passed through the electrolyte. Those bodies, only, are electrolytes which are composed of a conductor and a non-conductor of electricity. The conductors of electricity accumulate on the negative pole of the battery, and are the cations. The non-conductors accumulate on the positive pole and are the anions. These comprise all the general laws of electrolysis, so far as known.

The positive pole of a battery is now generally called the zincode, and the negative pole the platinode, because when zinc and platinum constitute the metallic plates of a battery, the zinc is positive and the platinum is negative.

Electro-plating consists in the electrolysis of a metallic salt, the object to be plated being connected with the platinode of the battery, as the metals, being electro-positive elements, or cations, will move to that pole, and accumulate upon it.

The objects to be plated must be chemically clean; that is, they must be entirely free from dust, grease, oxide, or tarnish from any cause. Oxides and sulphides are conveniently removed by polishing with rouge, and grease may be removed by washing with an alkaline solution. The surface thus prepared, the article, having a small slip of metal slightly soldered to the back, if necessary for convenience in attaching the wire, is suspended on a hook so that it is immersed in the electrolyte, or solution of a metallic salt, and the negative pole of the battery being connected by a conducting wire with the article to be plated, while a wire from the positive pole is connected with the electrolyte, the decomposition of the salt, and the deposition of the metallic element contained in it at once commence.

There are, however, many circumstances which may defeat success in electro-plating, and no amount of reading can compensate for practical experience in its execution. The metallic film may be imperfect, owing to the presence of impurities upon the surface of the article to be plated. This can be ascertained by examination, and remedied by the proper cleaning. Sometimes the rapid evolution of gas raises little blisters upon the surface, and at others, the deposit, instead of being smooth and granular, will be rough and crystalline. A great variety of means are employed by experts in the art to remedy these evils, such as wider separation of the poles, increasing the thickness of the conducting wire connected with the positive pole, warming the electrolyte, increasing or diminishing the number of elements in the battery employed, etc., etc. Experience, in these cases, is the best guide, in fact, it is the only one which can, with certainty, be relied upon.

The article, having received a sufficient coating, is washed, dried, and burnished, with the exception of such parts as are desired to remain as deposited, and this completes the operation.

IS THE WEATHER AFFECTED BY SOLAR ECLIPSES?

There is a popular belief that a season in which a solar eclipse occurs is either colder, or that the weather exhibits vagaries not observable in ordinary seasons. The present season has been in the vicinity of New York extremely cool, and more than an ordinary rainfall has taken place. This has not been universally the case, and must therefore be considered merely a local peculiarity of climate.

We have found that popular opinion very often has some basis in fact, although the cause may not be the one generally supposed to account for a given phenomenon. A good example of this is the discovery by Dr. Richardson, in his experiments with the great induction coil, at the London Polytechnic Institution, that arborescent marks may be produced on the bodies of persons struck by lightning, a fact which has been discredited by scientists. The popular opinion in regard to these marks has been that they were the images of trees photographed upon the skin by electrical agency.

Now, although the experiments of Dr. Richardson confirm the production of the marks, they show, that, instead of being images of trees or plants, they are the superficial tracings of blood vessels, which the electric current has followed on account of their greater conductivity.

So in the case of peculiar weather occurring at or near the period of a solar eclipse, we deem it probable that an examination may show the popular opinion to be correct, although the cause may have no immediate connection with the eclipse itself.

There remains, of course, the possibility that climatic peculiarities, thought to be more frequent at such periods, are merely coincident, but there is, undoubtedly, a growing disposition on the part of meteorologists to refer certain atmospheric phenomena to celestial and cosmical influences as their cause.

The subject is one of great interest and we should like to hear its pro's and con's discussed. Any of our correspondents who will give us facts bearing upon the subject will be welcomed to our columns. Theory will be out of place until the regular occurrence of peculiar atmospheric conditions in connection with solar eclipses is fully established.

THE DIAMONDS OF BRAZIL.

The diamond-washing establishments in Brazil have recently been visited by the distinguished traveler J. J. von Tschudi. On his way thither he was invited to stay in the neighboring town, Serro, where considerable commerce is going on in this gem. Tschudi was not little surprised when he witnessed how unsuspectingly the dealers intrust their goods. At the request of a friend he was immediately furnished with over 570 carats, or about one quarter of a pound of diamonds, making a value of 21,400 rix dollars.

One of the most remunerative washing establishments (Lavra) of Brazil is, according to Tschudi, that of San Joao de Barro. It is, however, not rich in stones of the first water, or those free from slightest faults, while diamonds of the second and third water are met with quite abundantly. Diamonds of the second water are called such, which exhibit spots, clouds, or flaws; but those having an undecided color, or that are injured by other material faults, are designated as being of the third water.

The washing operation requires considerable skill. For an inexperienced eye it is exceedingly difficult to detect a small diamond among a mass of glittering quartz, talc, or micaceous schist. Tschudi, in spite of carefully searching, and although the gem lay on the top of the sand, was unable to find it. To the keen and well-practiced eye of the negro, however, not a diamond of the size of a pin's head remains unnoticed.

The quantity of gems collected per day amounts to from thirty-five to seventy carats, which is equal to about one hundred and fifty diamonds. The gems collected, from the beginning of the season up to the time of Tschudi's stay, weighed 2,700 carats, and consisted for the greater part of beautiful stones, some of which exhibited a greenish tint, which disappears in grinding.

During the time when the washing establishments were under royal administration, every negro who found a diamond of seventeen and a half carats, received his entire freedom, and presents were awarded to those who found smaller ones. As to the etymology of the term carat, it is derived from the word *kuara*, the coral tree, the red pods of which, when dry, were formerly used for weighing gold dust. Four grains are equal to one carat, 151½ carats being equal to one ounce troy weight.

Dr. Lewis Feuchtwanger, in his treatise on gems, gives the following prices for diamonds in gold currency, viz.;

2 grains (half a carat), from	$ 68 to $75
3 " " "	80 to 90
1 carat "	110 to 140
1½ carat (6 grains)	200
2 " (8 ")	400
3 " (12 ")	1,200 to 1,400
4 " (16 ")	1,600 to 2,000
6 " (20 ")	3,000 to 4,000

Diamonds differ considerably in their color. Forty per cent are in general colorless, thirty per cent may exhibit a slight tint, and as many may show a decided color. Aside from the limpid or colorless stones, those of a dull whitish or greenish tint are most common. In polishing them some of the colors disappear, when the diamonds will distinguish themselves by their pure water. Light shaded rough stones are therefore not always less valuable than limpid ones. Light-tinged diamonds are more common than deep-colored ones, blue and green are very rare, and bring exorbitant prices.

Tschudi enumerates the following colors which diamonds exhibit: Citron and wine-yellow, brass, ocher, and brown-yellow, but not sulphur-yellow; light-brown, pink, and red-brown; rose, peach blossom, and cherry-red; green in all shades, as pale sea-green, leek color, pistachio olive, thistle-finch color, emerald and bluish green, greenish gray; light gray, ash gray, smoky gray, pure black and dirty black.

Most colored stones are found in Rio da Bagagne, they also occur frequently in Sincora in the province of Bahia. The most refractory to the cut is the black diamond, such as used for the carbon tool points, which were described in our issue of July 24. It mostly occurs in the latter province, sometimes in pieces of from one to two pounds.

One of the most extraordinary curiosities in the way of diamonds is a crystal inclosing a gold leaf. Dr. Nello Franca, who makes mention of this stone, asserts that the gold is seen as if not imbedded in the diamond at all. This peculiar specimen speaks against the hypothesis of those who consider this gem as having directly originated from carbon or carbonic acid.

PATENTS OR NO PATENTS---THE OPPONENTS OF PATENTS USED UP.

Our readers have been made aware that a movement has been for some time on foot in England to repeal the patent laws of that country. As might have been expected a lively discussion has taken place, and Mr. Macfie and Sir Roundell Palmer, the principal champions in Parliament of abolition, have received some rough handling, both in parliamentary debate and from the press. We learn from the *Scientific Review* that a conference of workingmen was held on Saturday, the 24th of July, at Shaftesbury Hall, Aldersgate street, London, under the auspices of Sir Roundell Palmer, M.P., Mr. Macfie, M.P., and a few other opponents of patent property, to consider the desirability of abolishing the patent laws.

Mr. R. Marsden Latham, of the Inventors' Institute, together with a deputation from the Delegates Invention-right Committee, a body composed of delegates from the Workingmen's Technical Education Committee, the Workmen's International Exhibition Committee; the Foremen Engineers' Association; the Workingmen's Club and Institute Union; the Public Museums and Free Libraries Association, and other workingmen's organizations, attended to watch proceedings, and if necessary to take part in the debate.

Sir Roundell Palmer, M.P., presided, and in the course of a long address, which though attentively listened to, provoked occasional expressions of dissent, said that the opinion he had formerly held in regard to the patent laws had materially changed, and he had now come to the conclusion that they did more harm than good, and therefore it would be better for the people if they were abolished. (Loud cries of "No"). Some men might neglect their business in the hope that a windfall might fall to them in the shape of some invention, but it was doubtful if one man in twenty drew a prize in the inventors' lottery. In many cases the most useful inventions got into the possession of employers and of capitalists. The legitimate reward of poor inventors would, probably, in the event of the abolition of the patent laws, fall to them much in same way as it did now. There was no analogy between the copyright in a book and the right to a mechanical invention. No two men could ever write the same two books, therefore no author could ever stand in the way of another. Ninety-nine patents when useful stood in the way of the people. (Cries of "No" and "Impossible.") They were monopolies—(cries of "No," and a voice: "Not more so than other descriptions of property")—and a patent was a monopoly given to one man for fourteen years, who had discovered something before any one else, but everyone was in search of the same thing. A stop was put to their exertions, as they could not proceed without paying a royalty to the man who had patented it. He considered that a person who had found out a new invention which might benefit mankind, had no right to block up the way for fourteen years by a monopoly which was called a patent. ("Oh!") Patents stood in the way of the improvement of the people in a far greater measure than they benefited the inventor. (Expressions of dissent).

Mr. J. W. Richardson remarked that the patent laws drove many men out of the country to America, where inventions were appreciated. (A voice: "America has better patent laws, and grants three times as many patents as are granted here." Cheers). He suggested that Greenwich Hospital should be converted into a museum of patents. Greenwich was near to London, and was a better site than South Kensington. He had received a very courteous letter from Mr. Gladstone in reply to an application for converting the hospital into a national patent museum, in which the right Hon. gentleman stated that the subject should have his best consideration. There was a national patent museum in America, which had been productive of great good, and he thought that if a national mechanical and designers' co-operative institution, to assist inventors, could be established in England, it would be productive of much benefit to the community.

Mr. J. R. Taylor, of Gray's Inn, speaking of the cost of obtaining and defending patents, concluded that it was almost an evil for a man to be an inventor and obtain a patent. (A voice: "Then cheapen patents and simplify the law.") He considered that patents for new inventions limited the national wealth. ("Oh!")

Mr. Clarke denounced the monopoly enjoyed by the Post-office and desired by the Government in the case of the telegraphs. This, he thought was a still greater evil than the so-called monopoly which the patent laws conferred.

Mr. Thomas Paterson said that what was wanted by the workingmen inventors of this country was a real security for their inventions—(hear, hear)—and he thought that they were as much entitled to a property in the results of their brain labor and expenditure of time and money in perfecting and elaborating new inventions as authors were to copyright in their books. (Loud cheers). He for one could not accept the finely-drawn sophisticated distinction between copyright and invention-right which Sir R. Palmer, with so much pains and ability, had endeavored to develop in his opening address—(loud cheers)—and he was satisfied that the good sense of the workingmen of England would prevail, and could not be imposed on by such hair-splitting arguments as had been addressed to them by the worthy chairman. (Hear, hear).

He contended that the patent law system was the best practical means of remunerating inventors yet devised—(cheers)—that without encouragement and remuneration inventors would never incur the cost and labor of devising new inventions—(cheers)—that the public introduction of new inventions could only be accomplished in a large majority of cases at great expense—(hear, hear)—and that manufacturers and capitalists would not embark money in publicly introducing new inventions, unless some inducement, such as the patent laws afforded, were accorded to them. (Loud cheers). To abolish all protection to invention would be to hand over all the profits of new inventions to the great capitalists, who would come in and undersell the inventor, which they could then easily do. Patents should be granted free from charge, and a tax might be imposed upon the profits of the patented article. He was one of the honorary secretaries of the Workmen's International Exhibition Committee, and they found that it was almost impossible to get skilled artisans to send new inventions for exhibition, unless some special security was guaranteed to them that their inventions would be freed from piracy. (Hear, hear). He had attended meetings of workingmen at the great centers of commerce, and in all parts of the country, and a general feeling prevailed among them, that the patent laws should not be abolished, but simplified and brought within the reach of all. (Loud cheers). To abolish the patent laws would be to plant the seeds of England's decline—(hear, hear)—and he could assure those of our legislators, who, seeking to obtain popularity, might truckle in favor of such a measure, that, among the working

classes at least, they should enjoy a popularity they little dreamt of. (Loud and continued cheering).

Mr. Macfie, M.P., touched upon the history of our patent laws, and the condition which always in the olden time attached to patents, that they should not make the article patented dearer to the public—a condition which had long been lost sight of. (A voice: "Patents make things cheaper."—Cheers.) Switzerland had no patent laws, and Germany and Holland had declared against them; it would therefore be impossible long to continue them in this country. He denied that the inventor had any exclusive right in his invention—("Oh, oh!")—but the inventor, whose invention was of national importance, ought to be paid out of the public funds, and he thought it possible to devise a scheme of rewards that should be satisfactory to all parties. (Laughter).

Mr. J. B. Galloway, of Newcastle-on-Tyne, was requested by the secretary to move the first resolution. As put into his hands this resolution was to the effect that the patent laws were "a hindrance to genius, science, and progress, and the progress of the whole civilized world, in however simple a form they may appear;" but he said that after the speeches he had heard he could not agree with this, and he would substitute the following: "That the meeting having heard the statements for and against protection for inventions by the existing patent laws, is of opinion that protection is absolutely necessary as a right, by which inventors may be secured a true legitimate right in their inventions," and to this he would add the second part of the resolution handed to him, resolving to assist in the formation of the proposed Co-operative National Mechanical Inventors and Designers' Progressive Institution, to forward genius, etc., and to obtain for the poor inventors of England the reward for their inventions.

This was seconded by Mr. G. F. Savage, who, in a powerful, close-reasoned speech, demolished the arguments advanced by Mr. Macfie. He mentioned several cases in which patents granted in this country had been refused in foreign countries, the result of which was that in those countries where no patent had been granted no manufacturer had thought it worth his while to make the articles. (Hear, hear). Dr. Normandy, the inventor of the well-known apparatus now in general use for converting salt water into aerated fresh water, patented his invention in this country, and then applied for a patent in Prussia, but the Prussian Government, in their usual style, refused to grant him a patent, and the result was that when the Prussian Government needed a supply of the machines, they found there was no one in that country who had engaged in their manufacture, and consequently that Government had to send to this country to obtain them from the patentee. He also stated that where no patent laws existed inventors invariably left the country and took their inventions to the best market. This was the case with Mr. C. W. Siemens, F.R.S., a native of Prussia, who left that country and came to reside in England, because practically no encouragement was accorded to inventors in Prussia. Mr. Siemen's regenerative furnaces and improvements in telegraphy had augmented our national wealth to the extent of several millions of pounds sterling, all of which was lost to Prussia through having practically no patent laws. As regarded Switzerland, about which so much had been said by Mr. Macfie, he was not aware that the Swiss people had invented anything better than the alpenstock. (Laughter). He believed there were no inventors in Switzerland, and he was sure that none of our manufacturers had occasion to fear competition from that quarter. It was notorious that Mr. Nasmyth, working under a patent, had supplied steam hammers cheaper and better than any manufacturer in the world, and it could be proved from numerous facts that instruments and machines constructed by persons not employed under a patent, were less cheap and less perfect than those that were. (Loud cheers).

The resolution having been put from the chair, was carried by an immense majority, amid loud cheers, only two hands—those of Mr. Macfie, M.P., and Mr. Clarke—being held up against it.

The following resolution was then proposed by Mr. Dunlop, seconded by Mr. Paterson, and carried by the same majority, amid tremendous cheering: "That an amended patent law which would give efficient protection to inventors at a low cost would be of the greatest value to this country, and enable it to maintain its supremacy in the arts."

Previously to the passing of the second resolution, Mr. Macfie made an excited but unsuccessful appeal for an adjournment of the meeting, and assured the audience that he was most anxious to promote the interests of workingmen by his action in the matter. (This statement was received with shouts of derisive laughter from all parts of the room).

LABOR IN CALIFORNIA.

We published last year a statement, copied from California papers, to the effect that more labor was needed there in nearly all departments of industry. This statement was denied by a correspondent, who stated that the report was circulated by those interested in cheapening labor, to the detriment of mechanics in that State, who, it was asserted, were even then more numerous than jobs.

The *Alta California* now states that the State is suffering great injury by the exceptionally high wages which prevail. With the exhaustion of the placers, the immediate cause of very high wages ceased. The value of town property in the mining districts has declined, and the range of employment has consequently been narrowed Combinations, however, have succeeded in forcing the pay for certain forms of labor up to a mark that bears no just proportion to its actual value or the rate at which other labor is compensated. The inequalities in this respect are pronounced by the San Francisco journalist "gross and unreasonable." The circumstance is rendered more noticeable by the fact that in the colony of Victoria, which now yields more gold than California the wages of mechanics and unskilled laborers are not half so high as those which prevail in the latter State.

Alloys Fusible at Low Temperatures.

We have known for some time past, several alloys fusible at temperatures below the boiling point of water. The one commonly known by the name of Newton alloy consists of eight parts of bismuth, five parts of lead, and three of tin. It fuses, according to Pelouze, at 94·5°, and according to Thenard at 90°. The one by D'Arcet, the most celebrated of all, is made of two parts of bismuth, with one part of lead, and one part of tin; it melts at 93°.

In a treatise on chemistry by Pelouze and Fremy, we are informed of another, composed of 5 parts of bismuth, three parts of lead, and two of tin, the fusing point of which comes as low as 91·6°.

Dr. Wood says that there exists another more recent than the latter, which was described in *Silliman's American Journal* as containing from seven to eight parts of bismuth, four parts of lead, and two of tin, to which two parts of cadmium are added. It is said to fuse between 66° and 71°. While engaged in galvanoplastic experiments, M. Lalance used seven to five parts of bismuth to one to five parts of cadmium. The alloy which he thus obtained, fused at the low temperature of 66°. The most surprising feature in this discovery is that its difference from the other alloys consists in the addition of a metal of more difficult fusibility than any of those contained in the ordinary alloy. The cadmium by itself only melts at a temperature of 360° C. The other components, lead, bismuth, and tin, fuse at 312°, 276°, and 230° respectively. Another point worthy of note in the preparation of alloys is the peculiar use made of bismuth. From the undermentioned table it will be at once apparent that the alloys at present in use consist to the extent of exactly one half of their weight of bismuth:

Metals.	Alloy of Newton.	Alloy of D'Arcet.	Alloy of Pelouze.	Alloy of Wood.
Bismuth.....	600	600	600	600
Lead.....	375	300	360	320
Tin.....	225	300	240	160
Cadmium.....	—	—	—	120
	1,200	1,200	1,200	1,200

The next discovery in this field ought to be an alloy fusible at the ordinary temperature.

THE heat of summer is stored up in the ocean, and slowly given out during the winter. Hence one cause of the absence of extremes in an island climate.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

The French Government has authorized the French Cable Company to lay a cable from Brest to England.

The soft rock of the Hoosac tunnel has been passed and solid rock struck again so that the contractors will not have so much to do with brick arching as they expected.

The Board of Health of this city has urged upon the Fire Commissioners the appointment of an inspector of kerosene and other burning fluids. The Fire Commissioners referred the request to a committee, and suggested instead, that some instrument capable of testing oil by the general public should be introduced.

The St. Louis County Court has decided to cease further operations in boring the artesian well, already the deepest in the world. The depth reached was 3,843½ feet, and the water obtained there was very salt. Some members of the court wished to continue the work until the well was 4,000 feet deep, but a majority decided against this on account of the expense; the latest work in boring being nearly forty dollars a day, and the progress made in that time about five inches. The well is to be plugged up at a depth of about 1,200 feet, where pure water can be obtained by pumping.

More than one thousand men are at work on the air line railroad between Middletown and New Haven. A few piles have been driven for the bridge across the Connecticut at the former place, simply to ascertain the nature of the river's bed.

Temperance principles and habits of cleanliness are not likely under present arrangements to make much headway in the City of Brotherly Love. Philadelphia is outgrowing its water supply. What with the low ebb to which the water of the Schuylkill River has fallen, the defective means of utilizing the available supply, and the late deplored conflagration of whiskey, lager beer must be at a premium. It is not often that we are able to give an instance in which our sanitary arrangements can compare favorably with those of Philadelphia; but in this case we are able to point with satisfaction to our abundance of water, and we suggest that our neighbors might do worse than imitate our example in the enterprise shown in the works by which we obtain our Croton supply.

Trade has lately received some impetus here on account of the low rate at which freight could be conveyed to the West over our principal railroads. Goods for Chicago which a short time ago were charged at $1·28 per hundred pounds for first class, $1·60 for second, and $1·27 for third, paid only 25 cents per hundred, while the fourth class, heretofore 82 cents, fell to 18 cents. A nearly equivalent reduction was made in the rates to other places The cause of this is stated to be a supposed violation of an agreement previously made by the great lines engaged in Western transportation, for a fixed rate applicable to all, except by the "all water" route, which, being slow, was 45 cents per hundred against $1·38 by the railroad lines. The difficulty will, it is supposed, be adjusted shortly and the old tariff will again be in force.

The weekly production of cotton at Lowell has amounted to 2,291,000 yards, and the number of spindles in the woolen and cotton manufactories is 457,512.

The great ship canal which is to connect Amsterdam with the North Sea, is now once more in progress, the Government of the Netherlands having relieved the contractors of certain difficulties which for a time hindered the work. The canal will be about fifteen miles in length. The Zuyder Zee is to be shut out from Amsterdam, and the Pampus dam by which this is to be effected is already half finished, and the locks and sluices connected with it are in progress. By this undertaking Holland will add one more to her grand engineering works, but it appears to be an English firm that holds the contract.

What California will one day be, with its healthful climate and fruitful soil, may be inferred from the present enterprise of her population. Already her manufactures are estimated at thirty millions of dollars per annum, and they comprise woolen and cotton factories, iron mills, tanneries, boiler works, brass founderies, saw mills, powder mills, paper mills, and almost every kind of manufacturing operations which can be found in our oldest states.

The Japanese colonists in California, have purchased another tract of land in Placer County for a tea and mulberry plantation. Herr Schell will return to Japan for the purpose of bringing a large addition to the colonists, and a fresh stock of mulberry plants.

The recent hot weather in Europe, it is said, has destroyed the oyster beds on the coast of France, and the oyster harvest of the present year will be a total failure.

About 45,000 tuns of ice are annually imported into Great Britain from Norway.

A mixture called "Hallogenia," which is intended to prevent the formation of incrustation in steam boilers, is sold extensively in Germany, and is said to answer the purpose very well. It consists of 65 per cent of sal ammoniac, 17 per cent of chloride of barium, and 18 per cent of catechu.

The Chicago *Railway Review* says the earnings of the Central Pacific Railroad for July were $579,000, an increase of $35,000 over the month of June. Notwithstanding the successive reductions of rates, the result of operations of the first three months since the connection of the eastern lines show a revenue at the rate of $7,000,000 per annum, of which $3,000,000 is net.

The Grand River nurseries, located five miles southeast of Lowell, Michigan, occupy 191¼ acres, having 600,000 apple trees, 200,000 peach, 50,000 cherry, 40,000 plum, 30,000 pear, 20,000 quince, and 60,000 miscellaneous trees and shrubs. There is also a vineyard with over 1,000 bearing vines.

The express car of Wells, Fargo, and Company, passing Elko, Nevada, on the 23d of July, had in it two tuns of bullion for New York.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per line will be charged.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; beside, as sometimes happens, we may prefer to address correspondents by mail.

PECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for at advertisements at $1'00 a line, under the head of "Business and Personal."

☞ *All reference to back numbers should be by volume and page.*

L. M., of N. Y.—Lime in the form of milk of lime will precipitate the carbonate of lime from water which is hard owing to the presence of that salt. The reaction is the combination of the lime with the carbonic acid in the water, which enables the water to hold the carbonate of lime in solution. If the water is allowed to stand long over precipitated carbonate of lime, it will, by the absorption of carbonic acid from the air, regain the power of dissolving the carbonate of lime which will render the water again hard.

R. O., of La.—We much doubt whether the sinking of a water wheel made hollow and water-tight between the arms, into water, so that its weight will be supported by its buoyancy and relieve the journals from friction, will be productive of a saving in power. We should expect the friction of the periphery upon the water which will support the wheel, to be more than that upon the journals in the ordinary way. You need not sacrifice any head to try your experiment. All that is necessary is to sink the wheel pit.

C. E., of Maine.—An illustration of your invention in the SCIENTIFIC AMERICAN could be obtained at less cost than an engraving done in inferior style and printed in circulars, which you would find it difficult to distribute judiciously in large quantities. This hint is a practical one, and worthy to be thought of. After we have printed an illustration we forward it to the patentee.

S. T., of Miss.—The object of rifle grooves is simply to give a rotary motion to the ball on its axis lying in the path of its projection. It is not to retard the ball so that the powder may exert greater force upon it before it leaves the gun. It has been found that the rotary motion thus imparted gives greater directness to the course of the ball, in other words, the ball will "go straighter" to the mark.

F. M. H., of N. Y.—We know nothing of the engine about which you inquire. It will only be fair for you to say that your boiler saves one hundred per cent of fuel over the best boilers now in use, when it has been proved by actual test to do what you say. You will probably wait some time for such evidence, as such a saving is not *theoretically* possible and is practically impossible.

H. C. S., of Ill.—We know of no simple test that can readily be applied to the detection of cotton seed oil in linseed oil. It is difficult to detect it with the best appliances known. The presence of lard oil, and similar adulterations, is best detected practically by the difficulty with which such oils dry. Linseed oil adulterated with lard oil will always be tacky when pure linseed oil has become hard and resinous.

J. H. H., of Va.—The ammonia prescribed as a remedy for toothache is the aqua ammonia of the shops. We advise you, if you are satisfied your neuralgia proceeds from decayed teeth, to have them extracted. In a personal experience which enables us to sympathize fully with you in your affliction, we have found that to be the only sure thing.

H. A. R. of Del.—The use of canned fruits and vegetables is constantly on the increase. We are informed that many manufacturers were unable to meet the demand for their goods last year. So you see that any improvement upon present processes in this industry, has a good chance for success. We are unable, however, to pronounce upon the value of your apparatus without seeing its operation. Your description of it is not clear to us.

V. C., of Pa.—We do not recognize any patentable features in your plan of steam engine. It seems to consist in a modification of the mechanism, and does not contain anything essentially new. The form is a good one no doubt to economize space, but even in this respect it is no better than some others.

E. B. J., of Ill.—You are all wrong in your premises. It is the oxygen that is consumed, *i. e.*, combined with carbon in the experiment you describe. The nitrogen is left. Oxygen does not support combustion by "mere presence." It unites chemically with the substances burned.

J. G., of Vt.—You are certainly an amateur, as you say, or you would know better than to use a file to finish a piece of metal in a lathe, which is required to be perfectly cylindrical. The turning tool should be the last tool to touch it. The best thing for you to do is to visit some machine shop and get some practical man to show you how to get a smooth finish without a file.

R. S., of Pa.—Hoe's rotary press was first used on the Philadelphia *Public Ledger* in 1847. The most important improvements in printing presses have been made within the last thirty years. The Bullock press prints on both sides of the paper the paper being fed in from a roll, and cut off in sheets after printing. The effect of rollers upon type is more injurious than the pressure of a flat surface.

J. C. McD., of Ca.—You are evidently confounding the terms "gather" and "set" as applied to wagon wheels. "Gather" is the inclination of the forward parts of the wheels towards each other, dependent upon the peculiar construction of the axletree. "Set" is the inclination of the bottoms of the wheels toward each other. Think the matter over again.

C. K. H., of La.—The resistances of media upon bodies of equal size moving with equal velocity and of the same weight and form, are as the densities of the media. Water being 800 times as dense as air will offer 800 times the resistance of air.

H. L. B, of N. Y.—We know of nothing better for polishing any kind of metal where a very high luster is required than rotten stone followed by Paris white and rouge. The latter was formerly very extensively used for polishing the silver plates for daguerreotypes.

J. K. J., of N. J.—The best qualities of chrome iron ore contain sometimes as high as sixty per cent of the oxide of chromium. We doubt whether you have found it as you seem to think, although it is possible. So far as we know it is only found in serpentine rocks, either in veins, masses, or pockets.

E. B., of Mass.—The connecting of your stove pipe with two chimneys will not avail to relieve you of the too powerful draft, unless one of the chimneys is much lower than the other. The answers to your other inquiries will be found in an article entitled "Hints on the Burning of Anthracite," which will shortly be published.

R. M. N., of Ga.—Mineral paints are for the most part oxides and sulphides of metals. The ochers about which you particularly inquire, are mixtures of the oxides of aluminum and the hydrated peroxide of iron, with, in some instances, oxide of manganese.

P. McC., of Cal.—There is plenty of room yet for new machines which will manufacture a good quality of wood pulp. To pay well they need only equal in efficiency some already in use. Should your machine prove to be superior to those, success awaits it. Actual experiment can only decide the question.

Petroleum Broker is reminded that in order to get his case before us properly he must put in an open appearance. We are not in the habit of wasting our time upon anonymous correspondents.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

PUMP.—R. W. Crouse, Westminster, Md.—The object of this invention is to provide for public use a double-acting pump, so constructed that it can be conveniently repaired when the packing becomes worn or injured.

MACHINE FOR COVERING LIGHTNING RODS WITH SHEET METAL.—W. S. Reyburn and F. J. Martin, Philadelphia, Pa.—This invention relates to a compound lightning rod, composed of an iron body, to give support, and a copper sheathing to furnish a good conducting surface.

CONVERTIBLE HOE AND FORK.—John H. Foster, Charlottesville, Va.—The object of this invention is to provide for public use a simple and durable instrument which can be adjusted to operate either as a hoe or a fork, and which can, at any time, be readily changed from one form to the other, as the work requires.

APPARATUS FOR PRINTING VIGNETTES.—Jean Elie Richard, Columbia, S. C.—This invention has relation to printing large vignettes from the solar camera. In order to print large vignettes, it is necessary that the prepared paper or blank should be placed at a distance from the camera, varying according to the diverging power of the lens and the size of the picture required.

GLASS HOUSE POT.—Thomas Scanlan, Birmingham, Pa.—The object of this invention is to provide for the use of glass manufacturers a pot or crucible in which to prepare the glass, so constructed and operating that it will produce more glass to a "filling" than those heretofore employed, and do its work in less time, and with greater convenience.

COMBINED HAY RAKE AND SEEDER.—A. P. Routt, Liberty Mills, Va.—This invention consists in an improved mode of fastening the teeth of a rake that may be used for raking hay, or for scratching in seed falling from a seed box placed in front of the rake. Also, in an apparatus for rendering the seeder inoperative when the machine is to be used solely as a rake.

EXCAVATOR.—H. H. Beard, Friar's Point, Miss.—This invention relates to a machine for ditching and leveling, in which the soil, cut out by the plows, is received upon an endless apron, and by that conducted to a second transverse endless apron; and the invention consists in making the said transverse apron in sections, and articulating said sections together, and in using plows of peculiar form.

PROCESS FOR PRESERVING VEGETABLES.—Francis H. Smith, Baltimore, Md.—This invention consists in taking Irish potatoes, sweet potatoes, and onions, in the raw state, slicing them, and then subjecting them to the action of steam or hot water, from five to fifteen minutes, as the nature of the vegetable under treatment may require. This operation "sets" or coagulates the albumen and starch contained within the vegetable cells, and prevents discoloration.

WASHING MACHINE.—D. C. Delinger, Decatur, Ohio.—This invention consists in providing a washing machine with two receptacles—one for water alone, and the other for water and clothes; said receptacle being connected by a pipe so that water may be forced from one receptacle to the other and back again, to effect the more thorough cleansing of the clothes; also, in an improved aperture for throwing the water from one receptacle to the other, and, at the same time, washing the clothes.

SIDE-SADDLE TREE.—Jacob Straus, St. Louis, Mo.—This invention consists in combining in one tree a cantle, a back rail, a back spring, and an extension spring, in such a manner as to form a continuous flange along the off and back sides of the tree, so that the latter, when covered with raw hide, forms a saddle in itself, sufficient for all ordinary purposes, and is, at the same time, a perfect tree, upon which a saddle of any sort, and of the most desirable shape, may be built up by an ordinary saddler.

MICROSCOPE.—James H. Logan, Allegheny City, Pa.—In this improved microscope, every part except the lens, screw, clips, and reflecting surface of the mirror, is made of wood. The main features of the invention consist in the general construction and arrangement of the parts, whereby it is possible to make them all of wood, without sacrificing strength and efficiency, together with a new and improved method of effecting the focal adjustment and the peculiar adaptation of the microscope to the convenient and efficient use of globule lenses.

TREADLE FOR MACHINERY.—Carlos Stebbins, Pike, N. Y.—This invention consists of a platform for the foot to rest upon, rigidly attached to the lower part of an oscillating stirrup, said stirrup having an arm projecting at nearly a right angle from the upper end of one of its side arms, the outer extremity of said arm being joined by a connecting rod to a wheel running upon a fixed pivot, from which motion may be communicated to machinery, the whole arrangement being intended to do its work with much less friction and resistance than ordinary treadles.

ATTACHING BELLS TO STRAPS.—Dwight M. Welch, Middle Haddam, Conn.—This invention consists in attaching bells to straps by means of a button or disk, which is soldered to the end of the shank of each bell after the latter has been inserted in a hole previously prepared for it in the strap, whereby a string of bells can be prepared in a few minutes, and at comparatively small expense. Patented Aug. 10, 1869.

STEAM GENERATOR.—J. Quipp and Robert Law, Buffalo, N. Y.—This invention consists in the use of a primary boiler, in which the steam is generated by the fire, and one or more secondary boilers in which the steam for use is generated by the steam from the first boiler; and it has for its object to provide a uniform application of heat to the secondary boilers, which is accomplished by the steam used for heating, which will be of the same temperature throughout the heating space.

COMBINATION LOCK.—Nicholas Reed, Otisville, N. Y.—This invention consists in an arrangement on a sliding locking bolt, engaging in a notch in the side of an ordinary slide bolt for locking it, of a series of combination disks capable of rotation thereon, and adjustment, to permit the said locking bolt to slide, or to prevent it, and also so arranged as to permit the changing places of the disks, and the position of the locking bolt to complicate the combination. It also consists in a guard attachment to hide the letters of the combination when locking, and to hold the disks in the right position while locking or unlocking.

STEM-WINDING WATCH.—James Nardin, Locle, Switzerland.—This invention relates to improvements in stem-winding watches, and watches having stopping devices for the second hands, having for its object to arrange the slides by which the winding devices are changed to gear with the hands, and the stopping is effected for better protection against being moved by the accidental contact of the said slides against anything whether the watch is in the pocket or otherwise. The invention also comprises an improved mode of operating the slide of the winding apparatus to gear the winding stem with the hands for turning them.

SODA WATER FOUNTAIN—Wm. Gee, New York city.—This invention relates to an improved method of connecting bungs, pipes, faucets, plugs, etc., to soda water and other cylinders, when made of thin sheet metal, and either coated or lined with tin or not. The object is to provide a connection for the bungs, etc., which will permit the ready removal thereof when they become worn or require removing from any cause, without disturbing the tin or lead linings of vessels, and without the employment of solder to make the connections tight, the solder being objectionable for the reason that it is difficult to remove for disconnecting the said bungs or other parts, besides being exposed in some of the vessels to the action of acids which destroy it and loosen the parts.

BOILER.—A. J. LeGrand, Boonton, N. J.—This invention relates to improvements in heating boilers, such as are used in houses for supplying hot water or for generating steam for heating buildings, or for heating by hot water, as in horticultural buildings.

BUTTON FASTENING.—John L. Remlinger, Providence, R. I.—This invention has for its object the construction of a simple device for retaining buttons, studs, etc., on shirts and other articles of wearing apparel. The invention consists of two L-shaped plates, of which one projects from the underside of the button, while the other is pivoted to it, so as to swi freely.

SELF-CLOSING TELEGRAPH KEY.—J. H. McElroy (assignor to himself, D. J. H. Holly, and H. McElrory), Warwick, N. Y.—This invention relates to improvements in telegraph keys, whereby it is designed to provide an improved self-closing arrangement by the employment of only one spring, so guarded that it cannot be opened by any slight inadvertant touch, or by anything dropping on it; also the combination therewith of a simple and convenient cut out device.

VELOCIPEDE.—S. H. Sawhill, Cambridge, Ohio.—This invention relates to a new two or three-wheeled velocipede, which is to be propelled by hand, and which is so constructed that it can be easily operated, and that the body of the rider will be sustained in the most advantageous position. The invention consists in several improvements of the driving mechanism of the foot supports and steering mechanism, which, separately or combined, tend to produce a simple and convenient apparatus.

SEED PLANTER.—John Stark, Thomasville, Ga.—This invention consists in a new manner of operating the seed slide, from the axle of the rear supporting wheel; also, in arranging a rotating reel within the drop-box for separating cotton seed and for breaking up lumps of fertilizing matter that might enter the box; and in providing adjustable gates for the seed apertures, the position of said gates being regulated by the aid of graduator scales.

BUTTON AND STUD.—Henry Link, Little Falls, N. Y.—This invention relates to a new manner of connecting the shank of a button or stud to the head or body of the same, so that the latter cannot fall off spontaneously, while it may be removed at will without difficulty.

REELING MACHINE.—E. L. Buckup, Stapleton, N. Y.—This invention relates to a new machine for automatically dividing thread into skeins and hanks, while the same is being wound upon a reel, thereby doing away with very tedious manual labor and with much attention, heretofore required in forming skeins and hanks.

GRINDING TOOL.—E. Babcock and T. B. Farrell, Laurens, N. Y.—This invention has for its object to provide an apparatus by means of which it will be possible for one man to hold a tool to be sharpened against the edge of a grindstone and to also turn the stone.

AXLE FOR VEHICLES.—John Grabach, Clyde, Ohio.—This invention relates to a new spindle and oil reservoir for wagon axles, and has for its object to provide a continuous self-acting lubricating device, by which the axle will be kept greased in a uniform manner. The invention consists in forming an oil reservoir with an adjustable slide on the shank of the spindle, and a spiral groove on the body of the spindle.

DEVICE FOR UTILIZING RECOIL OF HEAVY GUNS.—J. B. Eads, St. Louis, Mo.—This invention relates to a new method of storing up the power developed in the recoil of large guns, so that it may be afterward utilized at the will of the operator, to run the gun into battery, or to raise it above a parapet or other defense, to admit firing over the same. The invention consists principally in devices for causing the force of the recoil to compress an elastic substance or material, such as metallic or other springs, air, water, or other fluid, so that such compressed article or substance will, when allowed to expand, run the gun forward or elevate it as aforesaid, to bring it into position for firing.

CURD GRINDER.—C. W. Terpening, Geneseo, Ill.—This invention relates to a new machine for grinding curd and mixing it with salt, by means of grinding disks that operate above a vat. The object of the invention is to obtain means for rapidly treating and manipulating curd, and for properly blending the salt, so that there will be no danger of souring the curd and spoiling the cheese.

PIPE WRENCH.—Wm. H. Downing, Pioneer, Pa.—This invention relates to a new pipe wrench, which is so arranged that it will securely hold gas and other pipe, and allow it to be turned in either direction without releasing the pipe, and so that it can be adjusted to different sized pipe.

MURRAIN REMEDY.—Henry Jacobs, Fayetteville, Tenn.—This invention relates to a new medicine for the cure of murrain in cattle, and consists in a new combination of ingredients, which are compounded so as to produce an effective medicine.

TIRE AND BAND SHRINKER.—G. W. Dalbey, Carrollton, Miss.—This invention relates to a new device for shrinking all kinds of tires and bands, and consists of a novel arrangement and combination of parts, whereby both large as well as small tires and bands of all kinds can be shrunk to suitable sized circles.

FLOOR FOR MALT KILNS.—Wm. Gerhard, Jr., Florence, Mass.—This invention relates to a new manner of constructing malt kiln floors of longitudinal wires, and has or its object to avoid any projections on the drying surface.

SAFETY LAMP.—E. G. Kelley, New York city.—This invention has for its object to construct a non explosive lamp which is to be used with benzine, kerosene, naphtha, or other hydrocarbon liquids, and in which a collection of dangerous gases is impossible. The invention consists in providing the reservoir of the lamp with a vent for the escape of the gases that may be created in the lamp, and in covering such vent with wire gauze, or perforated metal, for the purpose of providing against the danger of igniting the contents of the lamp by igniting the escaping gases. The invention also consists in applying a wire gauze, or perforated sheet metal plate, to the lower end of the wick tube, to prevent the ignition of the contents of the lamp in case the flame on the wick should be blown into the wick tube.

WATER WHEEL.—P. H. Wait, Sandy Hill, N. Y.—This invention relates to a new manner of constructing the buckets of that class of water wheels which operate with a vertical inlet and discharge inward or central inlet, the guide chates being formed similar to the buckets, but in opposite direction. The object of the invention is to prevent the difficulties arising heretofore in wheels of the said class in which the direct acting point of the bucket moves at a velocity considerably less than the reacting point.

FRUIT BOX.—Geo. M. Fenley, Medora, Ind.—This invention relates to a new and useful improvement in the construction of a fruit box for transporting berries, etc., to market, the fruit box being so hinged together that, when empty, it may be folded up perfectly flat, thus enabling a large number to be packed in a small compass for re-shipment.

RAT TRAP.—J. M. Henrie, Vandalia, Iowa.—This invention consists of a box, preferably having two chambers or spaces, one being permanently covered and the other provided with a sliding cover, which is connected by rods to a crank shaft, to which a weighted cord is attached for rotating it. Each revolution of the crank shaft will withdraw and return the cover, and at each return it is locked, and held until the animal, getting on the cover for the bait, by his weight depresses a hinged part and unlocks it, permitting the weight to draw it back suddenly under a plate which scrapes the animal off into the pit below, where he is secured by the return of the cover. The invention also comprises a locking device for holding it closed when run down, an araangement of springs for quickly setting the cover into motion and arresting the motion of the said cover at the close of the return movement; also, a means of enticing the animals from the receiving chamber into another.

HOT AIR FURNACE.—Joseph E. Chapman, Cannon Falls, Minn.—This invention relates to a furnace for heating air for warming buildings, or for other purposes.

GAS GENERATING LAMP.—Lasslo Chandor, St. Petersburg, Russia.—This invention relates to an improvement in lamps, whereby it is designed to provide a simple, efficient, and safe lamp, which will, self-acting, generate gas from hydrocarbon oils, namely, petroleum, kerosene, naphtha, benzine, and turpentine, singly or in any way mixed, and all combustible fluids whatever, and burn the same without the aid of the glass chimneys now commonly used with lamps for burning these substances.

PISTON PACKING.—L. P. Garner, Ashland, Pa.—This invention consists in forming wedge-shaped recesses at the ends of the packing rings, and the employment of wedges fitting them, to be acted on when the cylinder takes steam, by the steam, to force them into the recesses to spread and thereby tighten the rings. The direct pressure of the steam on the inner faces of the rings is also made use of in conjunction with said wedges when required.

HAT PRESSING BAG.—Samuel Wing, Munson, Mass.—This invention relates to improvements in India-rubber or other elastic bags such as are used in the manufacture of straw, felt, and other hats, for holding them when in the pressing molds. The invention consists in the application to such bags of metallic forming rings to insure the proper formation at the corners or at all points or angles where two walls or parts meet.

HINGE COUPLING.—S. W. Perkins, Genesco, Ill.—This invention relates to a new and useful improvement in hinge couplings for the thills, shafts, or poles, of single or double carriages, and for many other purposes.

COMBINATION PENCIL SHARPENER AND PEN HOLDER.—Moses W. Dillingham, Amsterdam, N. Y.—This invention relates to a new and useful improvement in a device for sharpening lead-pencils and holding a pen.

ROCK DRILL POINT.—C. H. Davis, San Francisco, Cal.—This invention consists in removing parts of the edges of flat pointed drills by making notches or recesses from the point upward, so that the drills will cut only a part of the distance of their breadth, the stone along the other part being broken by the effect of the cutting part.

VINE CUTTER.—Charles Crenshaw, Bartlett, Tenn.—This invention has for its object to furnish an improved machine for cutting potato and strawberry vines, which shall be simple and inexpensive in construction, and effective in operation.

CAR WHEEL.—W. R. Thomas, Catasauqua, Pa.—This invention has for its object to furnish an improved car wheel, simple in construction, strong, and durable.

GUARD FOR CIRCULAR SAWS.—Isaac Holliday, South Brooklyn, N. Y.—This invention has for its object to furnish a simple and convenient device, by means of which the upper or exposed part of a circular saw may be covered in such a way as not to interfere with the operation of the saw, while preventing anything from coming in contact with and being injured by, or injuring said saw.

TRUSS FOR CONNECTING BOOMS TO MASTS.—James E. Tibbetts, Trenton, N. J.—This invention has for its object to furnish an improved device for connecting booms to the masts of vessels, which shall be simple in construction and safe in operation, and which will allow the boom to be conveniently removed when desired.

ELECTRIC FIRE AND BURGLAR ALARM.—Eugene Fontaine, Fort Wayne, Ind.—This invention has for its object to improve the construction of electric fire and burglar alarms, so as to make them more convenient in use, and more reliable and effective in operation.

CURRY COMB.—H. Mithoff, Columbus, Ohio.—This invention has for its object to furnish an improved curry comb, simple in construction, easily and cheaply made, which will at the same time be strong and durable.

PEN HOLDER.—C. G. Wilson, Brooklyn, N. Y.—This invention has for its object to furnish an improved pen holder, designed more particularly for those having stiff or crooked fingers or hands, and which shall be so constructed as to allow the pen to be held at any desired angle or inclination.

WATER WHEEL.—S. D. Taylor, Hazleton, Pa.—This invention relates to new and useful improvements in that class of water wheels known as turbines.

LAMP.—P. Prettyman, Paradise Spring Farm, Oregon.—This invention relates to improvements in lamps, whereby it is designed to provide an improved means for holding the glass chimneys thereon; preventing the wick tube from heating and the communication of heat to the oil chamber, and for facilitating the process of combustion.

REGISTERING APPARATUS FOR SPINNING FRAMES.—Henry P. Gregory, Plattsburgh, N. Y.—This invention relates to improvements in registering apparatus for spinning jacks, and other spinning machinery, the object of which is to so arrange them that dishonest operatives may be prevented from working them to make them register more than they would do by the legitimate operation of the machines to which they are attached.

STEAM PUMP.—L. P. Garner, Ashland, Pa.—This invention relates to improvements in that class of steam pumps, whereby two pump pistons are actuated by one engine, the piston rod of the engine forming one of the pump rods, and actuating the other through the medium of a cog wheel gearing into teeth on the piston rod of the engine, and also into corresponding teeth on the other pump rod.

HORSE HAY RAKE.—Thomas J. West, Alfred Center, N. Y.—The object of this invention is to provide a sulky attachment to the common horse hay rake, and suitable operating mechanism whereby the rake may be manipulated by the attendant while sitting on the seat of the sulky in advance of the rake.

HORSESHOE MACHINE.—Charles P. Williamson, Louisville, Ky.—This invention relates to improvements in machinery for forming horseshoe blanks, and has for its object to provide a simple and efficient arrangement of means for the purpose. The invention consists in an improved arrangement of oscillating bending dies, a sliding former, pressing and creasing die, and discharger.

NEW PUBLICATIONS.

COTTON CULTURE, AND THE SOUTH CONSIDERED WITH REFERENCE TO EMIGRATION. By F. W. Loring and C. F. Atkinson. Boston: A. Williams & Co., 100 Washington street.

This pamphlet is the embodiment of a large mass of information obtained by the authors in response to a circular letter addressed to the cotton planters of the South. It contains a large amount of interesting and authentic information, with a free discussion of the labor and immigration questions. Some extracts from this portion of the work will be found in another column.

BENEDICT'S TIME TABLES.

Benedict Brothers, 691 Broadway, whose "time" has been regarded for many years as standard in this city, are now issuing a series of very convenient time-table cards—small in size—which give the exact time of the departure of all the railway and steamboat lines leaving this city. They are carefully revised from official sources, and 200,000 copies of the cards are now freely circulated every month throughout the city and upon the trains and steamboats. The expense of their publication is met by advertisements printed upon the cards. It seems to us that, as an advertising medium, these time-table cards offer superior advantages.

THE RESOURCES OF CALIFORNIA. Comprising Agriculture, Mining, Geography, Climate, Commerce, etc., and the Past and Future Development of the State. By John S. Hittell. Fifth Edition, with an Appendix on Oregon, Nevada, and Washington Territory. San Francisco: A. Roman & Co. New York: 27 Howard street.

PHYSICAL SURVEY OF VIRGINIA, Her Geographical Position, its Commercial Advantages, and National Importance. Preliminary Report by M. F. Maury, LL.D., etc., Professor of Physics Virginia Military Institute, Lexington, Va., Gen. Francis H. Smith, A.M., Superintendent. Second Edition. New York: D. Van Nostrand, 23 Murray street, and 27 Warren street.

Inventions Patented in England by Americans.

[Compiled from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

2,153.—ANNEALING METALS.—James M. Bottum, New York city. July 15, 1869.

2,227.—PRESERVING THE AROMATIC PRINCIPLE OF HOPS.—E. D. Brainard, Albany, N. Y. July 22, 1869.

2,235.—TELEGRAPH-WIRE INSULATORS.—W. E. Simonds, Hartford, Conn. July 23, 1869.

2,241.—PURIFYING ALCOHOL AND PARAFFINE.—C. C. Parsons, New York city. July 23, 1869.

2,261.—REAPING AND MOWING MACHINE.—James Thayer, New York city. July 29, 1869.

2,264.—VALVE.—Gerard Sickles and J. H. Thorndike, Boston, Mass. July 26, 1869.

2,311.—STEAM ENGINE.—John Storer, Peekskill, N. Y. July 26, 1869.

2,329.—SPINNING MECHANISM.—R. L. Walker, Southbridge, Mass. August 3, 1869.

APPLICATIONS FOR EXTENSION OF PATENTS.

LOCK.—Sarah A. Holmes, administratrix of the estate of Richard G. Holmes, deceased, and William H. Butler, of New York city, have petitioned for an extension of the above patent. Day of hearing, October 18, 1869.

LATH MACHINE.—Andrew Blaikie, of San Francisco, Cal., and Walter Clark, of Marquette, Mich., have applied or an extension of the above patent. Day of hearing Oct. 18, 1869.

TOBACCO PRESS.—Rhudolphus Kinsley, of Springfield, Mass., has petitioned for the extension of the above patent. Day of hearing, October 25 1869.

LATHE CHUCK.—Eli Horton, of Windsor Locks, Conn., has applied for an extension of the above patent. Day of hearing, October 25 1869.

PLANING MACHINE.—James A. Woodbury, of Boston, Mass., has applied for an extension of the above patent. Day of hearing October 25 1869.

HAND SEED PLANTER.—D. W. Hughes, of Palmyra, Mo., has petitioned for the extension of the above patent. Day of hearing, November 1, 1869.

Official List of Patents.

Issued by the United States Patent Office.

FOR THE WEEK ENDING AUG. 17, 1869.

Reported Officially for the Scientific American.

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93,661.—VAPOR BURNER.—J. E. Ambrose, Lombard, Ill.

93,662.—HEAD-REST FOR DENTISTS' AND BARBERS' CHAIRS.—R. W. Archer, Rochester, N. Y.

93,663.—TOOL-HOLDER FOR HOLDING TOOLS WHILE BEING GROUND.—Egbert Babcock and T. B. Farrell, Laurens, N. Y.

93,664.—MODE OF MOUNTING ORNAMENTAL CROSSES.—W. B. Bennett, Providence, R. I.

93,665.—BUCKLE.—Herman Bernheimer and Henry Newman, New York city.

93,666.—MANUFACTURE OF AX BIT.—Charles Blair (assignor to the Collins Company), Collinsville, Conn.

93,667.—FRUIT GATHERER.—John Bowles, Augusta, Ga.

93,668.—BONE BLACK EQUALIZER.—Daniel Brasill and D. A. Mullane, New Orleans, La.

93,669.—PHOTOGRAPHIC PLATE HOLDER.—Joseph Buchtel, Portland, Oregon.

93,670.—REEL FOR WINDING YARN.—E. L. Buckup, Stapleton, N. Y.

93,671.—RAILWAY CAR AXLE.—H. D. Burghardt (assignor to himself and G. S. Willis, Jr.) Pittsfield, Mass.

93,672.—CLOTHES PIN.—M. E. Burlingame, Willett, N. Y.

93,673.—MANGER.—Adam Chambers, Unionville, N. Y.

93,674.—VAPOR BURNER.—Lasslo Chandor, St. Petersburg, Russia, assignor to Cassius M. Clay.

93,675.—HOT AIR FURNACE.—J. E. Chapman, Cannon Falls, Minn.

93,676.—COAL ELEVATOR.—L. S. Chichester, New York city.

93,677.—APPARATUS FOR ELEVATING AND WEIGHING COAL, ETC.—L. S. Chichester, Brooklyn, N. Y. Antedated August 5, 1869.

93,678.—TRUNK AND OTHER HANDLES.—John Churchill, Bristol, Conn.

93,679.—MACHINE FOR ROLLING HOE BLANKS.—W. T. Clement and E. V. Foster, Northampton, Mass. Antedated August 4, 1869.

93,680.—GANG PLOW.—Peter Conrath, Freeburg, Ill.

93,681.—VINE CUTTER.—Charles Crenshaw, Bartlett, Tenn.

93,682.—WAGON BRAKE.—C. J. Crounse, Clarksville, N. Y.

93,683.—MACHINE FOR UPSETTING TIRES.—G. W. Dalbey, Carrollton, Miss.

93,684.—ROCK DRILL POINT.—C. H. Davis, San Francisco, Cal.

93,685.—DOOR LATCH.—F. W. Dean, Tremont, Ill.

93,686.—POWER APPARATUS FOR VEHICLES.—J. G. Dillaha, Waco, Texas, assignor to himself, R. M. Boone, and N. D. Bailey, Chicago, Ill.

93,687.—PENCIL SHARPENER.—M. W. Dillingham, Amsterdam, N. Y.

93,688.—PIPE WRENCH.—W. H. Downing, Pioneer, Pa.

93,689.—ELECTRO-MAGNETIC ENGINE.—A. E. Dupas, New Orleans, La.

93,690.—HAND SEED PLANTER.—Jeptha Dyson, Philadelphia, Pa.

93,691.—GUN CARRIAGE.—J. B. Eads, St Louis, Mo.

93,692.—CULTIVATOR AND HARROW COMBINED.—Ezra Emmert, Franklin Grove, Ill.

93,693.—FRUIT CRATE.—G. M. Fenley, Medora, Ind.

93,694.—RAIN WATER CUT-OFF.—Edward Fleming (assignor for one half to G. A. Pease,) Ann Arbor, Mich.

93,695.—TEETH FOR CULTIVATORS.—H. F. French, Boston, Mass.

93,696.—STEAM PUMP.—L. P. Garner, Ashland, Pa.

93,697.—STEAM ENGINE PISTON PACKING.—L. P. Garner, Ashland, Pa.

93,698.—VAPOR BURNER.—T. S. Gates and A. H. Fritchey, Columbus, Ohio.

93,699.—CONDUCTOR FOR ROLLING MILLS.—John Gearing, Pittsburgh, Pa.

93,700.—SODA FOUNTAIN.—William Gee, New York city.

93,701.—FLOOR FOR MALT KILNS.—William Gerhard, Jr. Florence, Mass.

93,702.—WASHING MACHINE.—Edwin Gillis, Battle Creek, Mich.

93,703.—CARRIAGE SPRING.—J. W. Gilmer, and W. H. De Valin, Sacramento, Cal.

93,704.—MACHINE FOR DOUBLE-SEAMING SHEET METAL.—James Glober, Omaha City, Nebraska.

93,705.—MACHINE FOR TURNING THE EDGES OF SHEET METAL.—James Glober, Omaha City, Nebraska.

93,706.—MACHINE FOR PRESSING DOWN THE SEAMS IN SHEET METAL.—James Glober, Omaha City, Nebraska.

93,707.—CARRIAGE AXLE.—John Grabach, Clyde, Ohio.

93,708.—CLOTHES DRYER.—W. S. Graves, Kansas City, Mo., and A. S. Capron, Grass Lake, Mich.

93,709.—REGISTERING APPARATUS FOR SPINNING MULES.—H. P. Gregory, Plattsburg, N. Y.

93,710.—MACHINE FOR FORMING PLOW HANDLES.—G. V. Griffith, Fort Wayne, Ind.

93,711.—SASH FRAME AND FASTENER.—J. M. Hale, Georgia Plains, Vt. Antedated August 5, 1869.

93,712.—GRATE.—Robert Ham, Troy, N. Y.

93,713.—MANUFACTURE OF IRON AND STEEL.—James Henderson, New York city. Antedated August 4, 1869.

93,714.—RAT TRAP.—J. M. Henrie, Vandalia, Iowa.

93,715.—BENCH SHEARS.—John Hill, Charlotte, Mich., assignor to himself and William Adams.

93,716.—GUARD FOR CIRCULAR SAWS.—Isaac Holliday (assignor to himself and J. S. Dean), South Brooklyn, N. Y.

93,717.—REMEDY FOR MURRAIN IN CATTLE.—Henry Jacobs, Fayetteville, Tenn.

93,718.—CARPET BEATER.—Thomas Jordan, Brooklyn, N. Y.

93,719.—LAMP.—E. G. Kelley, New York city.

93,720.—COMBINING A LETTER BALANCE AND A PEN HOLDER.—R. B. Kepner, Philadelphia, Pa. Antedated August 12, 1869.

93,721.—FANNING MILL.—T. B. Kirkwood, Dublin, Ind.

93,722.—SIDE WALL REGISTER.—J. M. W. Kitchen, Brooklyn, N. Y.

93,723.—FLUE BRUSH.—J. D. Kunkel, Cincinnati, Ohio, assignor to himself, Frederick Stockhone and C. F. Hornberger.

93,724.—HEAD BLOCK FOR SAW MILLS.—C. Leflingwell, Clarksburg, Ohio.

93,725.—BOILER.—A. J. Le Grand, Boonton, N. J.

93,726.—BUTTON.—Henry Link, Little Falls, N. Y.

93,727.—GRINDING AXES.—Harvey Mann, Bellefonte, Pa.

93,728.—SELF-CLOSING TELEGRAPH KEY.—J. H. McElroy, Warwick, N. Y.

93,729.—MACHINE FOR SOWING PLASTER, GRASS-SEED AND GRAIN.—A. W. McKay, Elkhart, Ind.

93,730.—CULTIVATOR PLOW.—Neal McKay, Columbia, Mo.

93,731.—SEWING MACHINE.—Daniel Mills, New York city, assignor to Charles Goodyear Jr., New Rochelle, N. Y. Antedated Feb. 17, 1869.

93,732.—CURRY-COMB.—H. Mithoff, Columbus, Ohio.

93,733.—SAFETY GUARD FOR GUN NIPPLE.—C. T. Moore Gilmanton, N. H.

93,734.—ICE PITCHER.—Bernard Morahan, Brooklyn, N. Y.

93,735.—STEM WINDING WATCH.—James Nardin, Locle Switzerland, assignor to V. T. Magnin, Guédin, and Co, New York city.

93,736.—SCOOP.—Andrew Nonnamaker, Circleville, Ohio.

93,737.—HORSE POWER.—George Oerllein, Utica, Minn.

93,738.—HORSE POWER.—George Oerllein, Utica, Minn.

93,739.—PROCESS FOR PURIFYING PARAFFINE.—C. Chauncey Parson, New York city.

93,740.—TREADLE.—C. Chauncey Parson, New York city.

93,741.—THILL COUPLING.—S. W. Perkins, Genesco, Ill.

93,742.—COAL STOVE.—Jacob S. Platt, Philadelphia, Pa.

93,743.—TUCK-CREASING ATTACHMENT FOR SEWING MACHINES.—Wm. Preiss, New York city.

93,744.—LAMP BURNER.—Perry Prettyman, Paradise Spring Farm, Oregon.

93,745.—STEAM GENERATOR.—Jonathan Quipp and Robert Law, Buffalo, N. Y.

93,746.—TINSMITHS' SHEARS.—Ellery P. Ralph and James Hannan, Gallipolis, Ohio.

93,747.—COMBINATION LOCK.—Nicholas Reed, Otisville, N. Y

93,748.—BUTTON.—John L. Remlinger, Providence, R. I Antedated August 12, 1869.

93,749.—CULTIVATOR.—John J. Rose, Elmwood, Ill.

93,750.—HORSE HAY FORK.—John W. Roe, Lewisburg, Pa.

93,751.—VELOCIPEDE.—S. H. Sawhill, Cambridge, Ohio.

93,752.—EXPLOSIVE COMPOUND FOR USE IN FIREARMS, BLASTING, ETC.—Taliaferro P. Shaffner, Louisville, Ky.

93,753.—EXPLOSIVE COMPOUND.—Taliaferro P. Shaffner, Louisville, Ky.

93,754.—EXPLOSIVE COMPOUND.—Taliaferro P. Shaffner, Louisville, Ky.

93,755.—BLASTING FUSE.—Taliaferro P. Shaffner, Louisville, Ky.

93,756.—MANUFACTURE OF NITRO-GLYCERIN.—Taliaferro P. Shaffner, Louisville, Ky.

93,757.—METHOD OF BLASTING WITH GUNPOWDER AND OTHER EXPLOSIVE SUBSTANCES.—Taliaferro P. Shaffner, Louisville, Ky.

93,758.—MAKING CAST STEEL.—Charles William Siemens, Westminster, England.

93,759.—DEVICE FOR SHIFTING BUGGY TOPS.—W. B. Slutter, Warsaw, Ind.

93,760.—TOY TOP.—Thomas E. Sparks, Norwich, Conn.

93,761.—ADJUSTABLE CLUTCH FOR LIFTING WELL TUBING.—Wm. A. Spring, Titusville, Pa.

93,762.—SEEDING MACHINE.—John Stark, Thomasville, Ga.

93,763.—CAMERA STAND.—Isaac H. Stoddard, Amenia, assignor to E. and H. T. Anthony and Company, New York city. Antedated August 12, 1869.

93,764.—FURNACE FOR STEAM GENERATORS.—Friedrick Sulter, St. Paul, Minn.

93,765.—HARVESTER.—Lorens Swenson, North Cape, Wis.

93,766.—FASTENER FOR WHIP SOCKETS.—O. W. Swift, New Haven, Conn.

93,767.—WATER WHEEL.—S. D. Taylor, Hazleton, Pa.

93,768.—CURD GRINDER.—C. W. Terpening, Geneseo, Ill.

93,769.—CAR WHEEL.—W. R. Thomas, Catasauqua, Pa.

93,770.—TRUSS FOR CONNECTING BOOMS TO MASTS.—James E. Tibbetts, Trenton, N. J.

93,771.—COMBINED WATER TANK AND WARMING CLOSET.—Joel Tiffany, Albany, N. Y.

93,772.—OILER FOR THE SLIDES OF STEAM ENGINES.—Christopher C. Tracy (assignor to himself and James E. Grannis), New York city.

93,773.—CHAIR, TABLE, AND STAND COMBINED.—Abigail W Viles, Elkhorn, Wis.

93,774.—WATER WHEEL.—P. H. Wait, Sandy Hill, N. Y.

93,775.—KINDLING WOOD.—J. Wesley Webber, New York city.

93,776.—MANUFACTURE OF FLOOR OIL-CLOTH.—John Weems and Wm. Weems, Johnstone, Great Britain.

93,777.—HORSE RAKE.—Thomas J. West, Alfred Center, N. Y

93,778.—HORSESHOE MACHINE.—Charles P. Williamson, Louisville, Ky.

93,779.—RAILWAY STOP CHAIR.—John A. Wilson, Altoona, Pa.

93,780.—PEN HOLDER.—Charles G. Wilson, Brooklyn, N. Y.

93,781.—STOVE AND FURNACE GRATE.—George A. Wing, Albany, N. Y.

93,782.—BASE-BURNING STOVE.—George A. Wing, Albany, N. Y.

93,783.—HAT-SHAPING MACHINE.—Samuel Wing, Munson, Mass.

93,784.—QUILTING FRAME.—George C. Winters (assignor to himself and Edwin Miller), Winfield, Mich.

93,785.—PEPPER CASTER.—Ferdinand Wolf (assignor to himself and Henry Hanf), South Boston, Mass.

93,786.—CARRIAGE JACK.—Joseph E. Woll, Allegheny City Pa.

93,787.—SAWING MACHINE.—Hollis Woodward, Milwaukee, Wis. Antedated August 5, 1869.

93,788.—COCK-EYE FOR HARNESS.—Lyndon Worster, Syracuse, N. Y.

93,789.—FLEXIBLE WAINSCOT.—John F. Worth, Brooklyn, N. Y.

93,790.—FEED-WATER HEATER.—Peter C. Wortman, Meadville, Pa.

93,791.—CARRIAGE.—Benjamin F. Adams, Bangor, Me.

93,792.—BUCKLE.—Theodore Bailey, Fairfax county, Va., and Howard H. Young, Washington, D. C.

93,793.—CHAIN STOPPER.—William D. Barker, East Abington, Mass.

93,794.—PUMP.—A. Balding, Memphis, Tenn.

93,795.—APPARATUS FOR CARBURETING AIR.—J. F. Barker, Springfield, Mass., and C. N. Gilbert, New York city.

93,796.—EXCAVATOR.—H. H. Beard, deceased, Friar's Point, Miss. (W. J. St. John administrator.)

93,797.—METALLIC REMEDY FOR RHEUMATISM.—Moses Bernheim, New York city.

93,798.—FRICTION CLUTCH.—Erastus B. Bigelow, Boston, Mass.

93,799.—HARNESS-OPERATING MECHANISM FOR LOOMS.—Erastus B. Bigelow, Boston, Mass.

93,800.—POWER LOOM FOR WEAVING PILED FABRICS.—Erastus B. Bigelow, Boston, Mass.

93,801.—STEADY REST FOR LATHES.—James Brodie, San Francisco, Cal.

93,802.—SODA-WATER APPARATUS.—J. R. Brown, New Haven, Conn.

93,803.—MACHINE FOR CUTTING LEATHER INTO ROUND BANDS.—Christopher G. Burnham (assignor to himself and Lewis H. Rogers), East Hartford, Conn.
93,804.—PAINT.—Eben S. Burns, Portland, Me.
93,805.—HAY TEDDER.—A. H. Caryl, Groton, Mass.
93,806.—HAY RAKER AND LOADER.—Jacob F. Chandler (assignor to himself and Abner F. Durgin), Concord, N. H.
93,807.—COUNTERSINK AND BIT.—William A. Clark, Woodbridge, Conn.
93,808.—HOLLOW AUGER.—William A. Clark, Woodbridge, Conn.
93,809.—PAPER BOX.—H. H. Dorbin, New Britain, Conn.
93,810.—PUMP.—R. W. Crouse, Westminster, Md.
93,811.—MECHANISM FOR OPERATING THE NIPPERS OF COMBING MACHINES.—Horace Daniels, Pawtucket, R. I.
93,812.—WASHING MACHINE.—David C. Delinger, Decatur, Ohio.
93,813.—HORSE POWER.—John B. Fassett, Irasburg, Vt.
93,814.—SHOE.—Frank T. Ferguson, Boston, Mass.
93,815.—SPRING CUSHION.—Chester D. Flynt, Philadelphia, Pa.
93,816.—ELECTRIC FIRE AND BURGLAR ALARM.—Eugene Fontaine, Fort Wayne, Ind.
93,817.—MANUFACTURE OF SUGAR OF LEAD AND ACETIC ACID.—Leonard D. Gale, Washington, D. C., and Isaac M. Gattman, New York city.
93,818.—CHURN.—W. L. Gordon, Dalton, Ga.
93,819.—LIFE-PRESERVING MATTRESS.—J. Durell Greene, Cambridge, Mass.
93,820.—FRUIT JAR.—Charles A. Gregory (assignor to himself and Allen Gregory), Stratford, Conn.
93,821.—BASE-BURNING STOVE.—Luther W. Harwood, Troy, N. Y.
93,822.—BREECH-LOADING FIRE-ARM.—B. B. Hotchkiss, New York city.
93,823.—RUBBER ERASER.—S. D. Hovey, Brooklyn, N. Y.
93,824.—COMPOUND TOOL FOR WATER AND GAS PIPES.—Wm. Humphreys, Waterford, N. Y.
93,825. — CARRIAGE SEAT. — Israel Kinney, Woodstock, Canada.
93,826.—AUTOMATIC BOILER-FEEDING APPARATUS.—Thomas Lovelidge and John Grindrod, Philadelphia, Pa.
93,827.—CHURN.—Addison Moe, Plainfield, N. J.
93,828.—DUMPING WAGON.—C. T. Moore, Gilmanton, N. H.
93,829.—HORSE HAY RAKE.—Daniel B. Neal, Mount Gilead, Ohio.
93,830.—TILE MACHINE.—Solomon Nill, and Daniel Nill, Covington, Ohio.
93,831.—SCISSORS SHARPENER.—Charles E. Palmer, Boston, Mass.
93,832.—BURIAL CASE.—A. S. Patterson, Westfield, N. Y. Antedated Aug. 7, 1869.
93,833.—ICE VELOCIPEDE.—Adam Purvis, Louisville, Ky.
93,834.—MACHINE FOR COVERING LIGHTNING RODS WITH SHEET METAL.—W. S. Reyburn and F. J. Martin, Philadelphia, Pa.
93,835. — APPARATUS FOR PRINTING PHOTOGRAPHIC VIGNETTES.—Jean Elie Richard, Columbia, S. C.
93,836.—MACHINE FOR POUNCING HATS.—John C. Richardson, Newark, N. J., assignor to himself and J. H. Prentice, Brooklyn, N.Y. Antedated Aug. 5, 1869.
93,837.—WOOD PAVEMENT.—W. O. Robbins (assignor to himself and C. W. Stafford), New York city.
93,838.—COMBINED SEEDER AND HAY RAKE.—A. P. Routt, Liberty Mills, Va.
93,839.—GLASS HOUSE POT.—Thomas Scanlan, Birmingham, Pa.
93,840.—COOLING AND VENTILATING APPARATUS.—John J. Schillinger, New York city.
93,841.—PROCESS OF PRESERVING VEGETABLES. — Francis H. Smith, Baltimore, Md., assignor to Francis H. Smith, Jr., New York city.
93,842.—TREADLE.—Carlos Stebbins, Pike, N. Y.
93,843.—SIDE-SADDLE TREE.—Jacob Straus, St. Louis, Mo.
93,844.—CARVING DISH.—C. W. Sykes, Suffield, Conn. Antedated Aug. 13, 1869.
93,845.—SHUTTLE FOR SEWING MACHINES.—James C. Wade, Boston, Mass.
93,846.—BOOT AND SHOE.—G. W. Walker, Lowell, Mass.
93,847.—MACHINE FOR PLANING METAL.—Alonzo Whitcomb, Worcester, Mass.
93,848.—SCREW PROPELLER.—Frederick Wittram, San Francisco, Ca..
93,849.—COMPUTING APPARATUS.—Elizur Wright, Medford, Mass.
93,850.—RAILWAY CAR COUPLING.—Robert K. Andrews, South Valley, N. Y.
93,851.—DEVICE FOR RELIEVING STEAM GENERATORS OF FOREIGN SUBSTANCES.—Francis Armstrong, Pittsburgh, Pa.
93,852.—APPARATUS FOR AERATING AND COOLING DISTILLED WATER.—G. W. Baird, Engineer Corps, U. S. Navy.
93,853.—PLOW.—Ephraim Ball, Jr., Canton, Ohio.
93,854.—HOT-WATER BOILER FOR STOVE.—J. S. Brooks, Rochester, N. Y.
93,855.—MACHINE FOR MAKING BARRELS.—Wm. Brown, St. Louis, Mo.
93,856.—SAFETY ATTACHMENT FOR POCKETS.—A. W. Browne, Brooklyn, E. D., N. Y., assignor to himself and Andrew Breasted, New York city.
93,857.—APPARATUS FOR THE MANUFACTURE OF PIG BLOOMS FROM CAST IRON.—J. A. Burden, Troy, N. Y.
93,858.—RAILWAY CAR AXLE BOX.—William Campbell, Clinton, Iowa.
93,859.—MANUFACTURE OF READY-PREPARED ROOFING.—J M. Cobb, Beloit, Wis.
93,860.—FENCE.—J. M. Crull, Noblesville, Ind.
93,861.—CIDER AND WINE MILL.—T. F. Deniston, G. C. Prosser, and J. J. Deniston, Torrey, N. Y.
93,862.—KITCHEN UTENSIL.—Jacob J. Diehl, York, Pa.
93,863.—CASTING STEEL INGOTS.—Henry Disston and Jonathan Marsden, Philadelphia, Pa., assignors to Henry Disston.
93,864.—MEAT SAFE FOR BUTCHERS AND OTHERS.—J. J. Doepken, Lima, Ohio.
93,865.—MODE OF TREATING BONEBLACK FOR FILTERING SIRUPS, ETC.—J. O. Donner, Jersey City, N. J.
93,866.—BOTTLE LOCK.—James Dugan, New York city. Antedated Aug. 12, 1869.
93,867.—MACHINE FOR DRESSING MILLSTONES.—John East, Romeo, Mich.
93,868.—MARINE RAILWAY.—Primus Emerson, Carondelet, Mo.
93,869. — CULTIVATOR HOE. — John H. Foster, Charlottesville, Va.
93,870.—MANUFACTURE OF OYSTER KEGS.—Geo. Frauenberger, Rochester, N. Y.
93,871.—LAMP.—Joseph Funk, Tompkinsville, N. Y.
93,872.—DUMPING CAR.—C. Gates, Burlington, Ind., assignor to Geo. Burkhardt, Joseph Shiffer, and J. W. Green.
93,873.—SAWING MACHINE.—Adolphe Gaudron, Detroit, Mich.
93,874.—BOILER TUBE SCRAPING DEVICE.—Edward Green, Wakefield, England. Patented in England Aug. 25, 1866.
93,875.—RAILWAY CHAIR AND SLEEPER. — John Gregory, Lisbon, Portugal. Patented in England October 28, 1868.
93,876.—ARTIFICIAL LEG.—S. G. Gregory, Albany, N. Y.
93,877.—FIRE LADDER.—D. F. Haasz, Philadelphia, Pa.
93,878.—WINDLASS.—W. H. Harfield, London, England. Patented in England Feb. 18, 1867.
93,879.—CHURN.—Samuel Harper, Lawrence, Kan.
93,880.—WASHING MACHINE.—O. L. Hart, Millville, Wis.
93,881.—SEWING MACHINE.—H. C. Heckendorn, Reading, Pa.
93,882.—REFLECTING LAMP CHIMNEY.—Horace L. Hervey, Philadelphia, Pa.
93,883.—WEATHER STRIP.—Coleman Hicks, Lancaster, Ky.
93,884.—STEAM WATER GAGE INDICATOR FOR BOILERS.—W. Hodgson, Cincinnati, Ohio.
93,885.—FRUIT DRYER.—Israel Hogeland, Indianapolis, Ind.
93,886.—WASH BOILER.—J. W. Hoit, Lebanon, Ill.
93,887.—FORK FOR PEACH PEARERS.—C. D. House, Lake Village, N. H.
93,888.—ATTACHING PLOW COULTERS.—D. W. Hughes, Palmyra, Mo.
93,889.—STEAM CYLINDER PISTON PACKING.—Wm. Johnson, Lambertville, N. J.
93,890.—BRICK DRAIN TILE.—Norris Jones, Centerville, Ind.
93,891.—BURNING KILN.—Balthasar Kreischer, New York city.
93,892.—MACHINE FOR TURNING WATCH CASES.—Jacques Laurent, New York city.
93,893.—MACHINE FOR MOLDING CHAIR BACKS.—John Lemman, Cincinnati, Ohio.
93,894.—MACHINE FOR CUTTING AND REDUCING LOAF SUGAR.—A. E. Letorey, Rouen, France.
93,895.—SINGLE MICROSCOPE.—J. H. Logan, Allegheny, Pa.
93,896.—KNIFE FOR SEEDING STONE FRUIT.—S. S. Marques, Mason, Ill.
93,897.—HAY RACK.—David Matteson, Pittsfield, Mich.
93,898.—STONE-SAWING MACHINE.—Richard Morgan (assignor to himself and Henry Tirrel), St. Louis, Mo.
93,899.—PROCESS OF TREATING ORES WITH COPPER AMALGAM BY MEANS OF ELECTRIC CURRENTS.—A. L. Noll and F. L. A. Pioche, San Francisco, Cal.
93,900.—MATERIAL FOR DYEING AND PRINTING, OBTAINED FROM MADDER.—Alfred Paraf, New York city.
93,901.—FEATHER RENOVATOR.—J. W. Perry, Perrysburg, N. Y.
93,902.—PROPELLING APPARATUS.—F. R. Pike, New York city.
93,903.—MACHINE FOR PLANING METAL.—F. A. Pratt, Hartford, Conn.
93,904.—REFRIGERATOR.—T. L. Rankin, Peru, Ill.
93,905.—CLOTHES-PIN HOLDER.—V. Reifsnider, Chicago, Ill.
93,906.—TOOL HOLDER.—Ezra Ripley, Troy, N. Y., assignor to himself and G. S. Prindle, Aurora, Ill.
93,907.—SCHOOL DESK.—A. E. Roberts, Des Moines, Iowa.
93,908.—ARROW GUN.—Charles Robinson, Boston, Mass.
93,909.—RAILWAY RAIL SPLICE.—John C. Rupp, Newark, Del.
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93,929.—COOKING STOVE.—Nicholas S. Vedder, Troy, N. Y. Antedated July 13, 1869.
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93,937.—CENTERING AWL.—D. A. Wilcox, Woodstock, Vt. Antedated Feb. 17, 1869.
93,938.—COOKING STOVE.—W. F. Williams, East Birmingham, Pa.
93,939.—FIRE-PLACE GRATE.—Walter S. Withers, Atlanta, Ga.
93,940.—STEAM ENGINE.—G. W. Wright (assignor to Francis Wright), Washington, D. C.
93,941.—COMPOSITION FOR PLASTERING WALLS.—D. Young, Kokomo, Ind.
93,942.—WASHING MACHINE. — Friedrich Brinck, Chester, Ill.
93,943.—LOCK NUT.—Frederick Oakley, Toronto, Canada.

REISSUES.

47,782.—HOISTING APPARATUS.—Dated May 23, 1865; reissue 3,596.—George Ambrose, for himself, and Edward Hagan, assignee of G. Ambrose, New York city.
66,773.—PAINT.—Dated July 16, 1867; reissue 3,051, dated July 28, 1868; reissue 3,597.—Division A.—D. R. Averill, New Centreville, N. Y., for himself, and the Averill Chemical Paint Company, New York city, assignees of D. R. Averill.
66,773.—PAINT.—Dated July 16, 1867; reissue 3,051, dated July 28, 1868; reissue 3,598.—Division B.—D. R. Averill, New Centreville, N. Y., for himself, and the Averill Chemical Paint Company, New York city, assignees of D. R. Averill.
66,773.—PAINT.—Dated July 16, 1867; reissue 3,051, dated July 28, 1868; reissue 3,599.—Division C.—D. R. Averill, New Centreville, N. Y., for himself, and the Averill Chemical Paint Company, New York city, assignees of D. R. Averill.
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66,773.—MANUFACTURE OF PAINT.—Dated July 16, 1867; reissue 3,051, dated July 28, 1868; reissue 3,601.—Division E.—D. R. Averill, New Centreville, N. Y., for himself, and the Averill Chemical Paint Co., New York city, assignees of D. R. Averill.
46,299.—SHOE.—Dated Feb. 7, 1865; reissue 3,602.—Case A.—Charles Buffum, Lynn, Mass., assignee of J. B. Johnson.
68,932.—SLIDE VALVE.—Dated Sept. 17, 1867; patented in England, Feb. 15, 1866; reissue 3,603.—Orlo Cady, Morristown, Vt., and Wm. W. W. Wood, Brooklyn, N. Y., assignees, by mesne assignments, of Thomas Adams and G. J. Parson.
90,733.—COMPOSITION PAPER POLISHER.—Dated June 1, 1869; reissue 3,604.—H. T. Cushman, North Bennington, Vt.
87,097.—CLAMP FOR ELEVATING WELL TUBES.—Dated Feb. 23, 1869; reissue 3,605.—Daniel Fisher, Oil City, Pa.
82,266.—CLOCK.—Dated Sept. 15, 1868; reissue 3,606.—J. B. Mayer, Niagara Falls, N. Y.
79,404.—VAPOR BURNER.—Dated June 30, 1868; reissue, 3,607.—J. D. Smith, Greig, N. Y., assignee of W. H. Smith.
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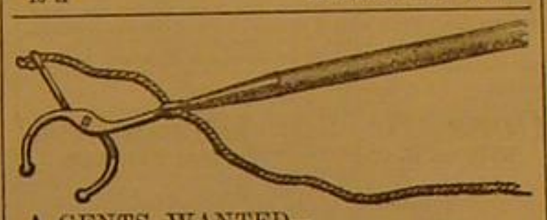

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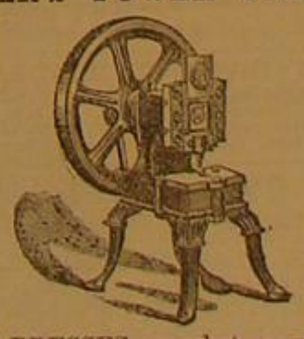

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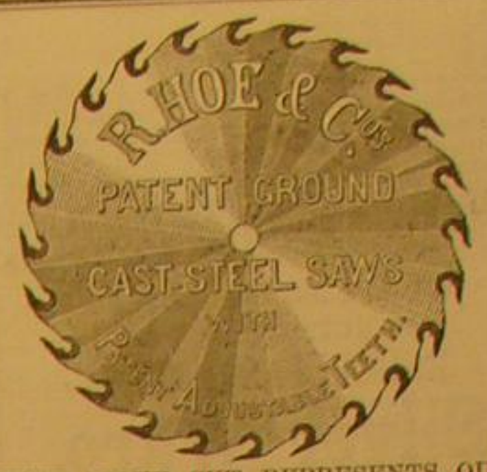

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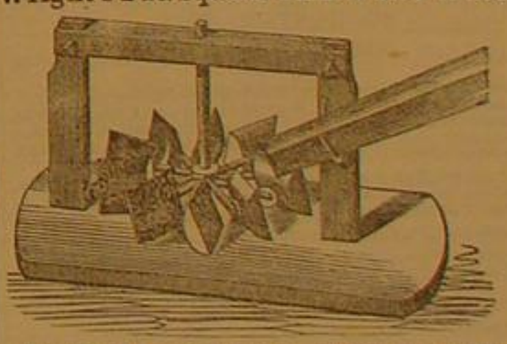

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THE Union Iron Mills, Pittsburgh, Pa. The attention of Engineers and Architects is called to our improved Wrought-iron Beams and Girders (patented), in which the compound welds between the stem and flanges, which have proved so objectionable in the old mode of manufacturing, are entirely avoided, we are prepared to furnish all sizes at terms as favorable as can be obtained elsewhere. For descriptive lithograph address the Union Iron Mills, Pittsburgh, Pa. 21 tf

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N. B.—This detector is covered by two U. S. patents. Parties using or selling these instruments without authority from me will be dealt with according to law.

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SCIENTIFIC AMERICAN

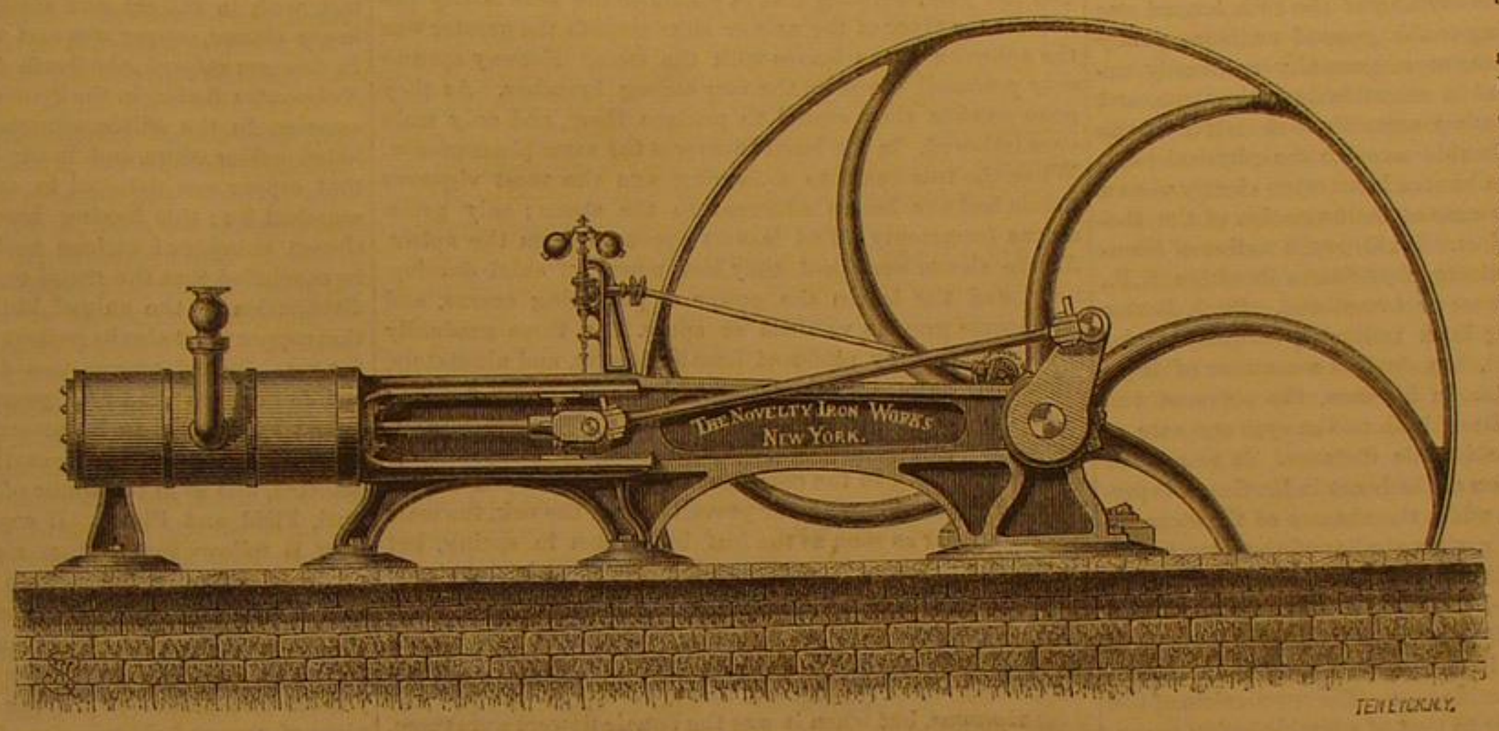
A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

Vol. XXI.---No. 11. (NEW SERIES.) NEW YORK, SEPTEMBER 11, 1869. $3 per Annum [IN ADVANCE.]

Improvement in Steam Engines.

The engraving represents the non-condensing stationary steam engine manufactured at the Novelty Iron Works, New York city. This large and well-known establishment has resumed the manufacture of stationary steam engines as a specialty. They have at a very considerable expense conducted an extensive series of experiments so as to amend, if necessary, their practice by a positive knowledge of that which is best. They intend soon to publish, for the information of others, the results of these experiments and of their long experience in this particular branch of manufacture.

The name of the Novelty Iron Works is so well and favorably known that it is of itself a sufficient guarantee of the good workmanship and reliable performance of the engine we represent in our columns, in addition to which it presents to the eye a substantial, tasty, and attractive appearance.



STATIONARY STEAM ENGINE.

The bed-plate of the engine is of the style designed many years ago by Mr. Horatio Allen, President of the Novelty Iron Works, and has since been extensively copied by other manufacturers. It may be described as a cast-iron box, attached to which, and forming part of the same casting, are the main guides and strong legs with broad feet—the whole frame being more or less ornamented. One end of the frame also forms a cylinder head, and the other the main pillow block, by which means the reacting pressure on the cylinder is transmitted directly to the shaft by a single structure, in which the greatest weight of metal is disposed directly in the line of the strains, and the construction is such that it is impossible for the cylinder to get out of line. The old style of a bed-plate lies far below the line of direct pressure, and is sprung more or less at every stroke of the engine; besides which, the cylinder, main slides, and pillow block, get out of line, from the fact that they are bolted directly to the top of the bed-plate in such a manner that the joints lie parallel to the line of strain.

The steam is admitted to and from the cylinder by a plain slide valve, so arranged that the cylinder ports are very short and direct, and the amount of steam required to fill the clearance and port is believed to be less than in any other engine manufactured.

The cut-off consists of two plates sliding on the back of the main valve and operated by a separate eccentric. This cut-off is either set at a fixed point, in the usual way, or made so that it can be adjusted by hand, from zero to seven eighths stroke, by simply turning the cut-off valve stem. Preferably, however, the adjustment is made by the governor through a simple arrangement which we will try and make understood without illustrations. The cut-off is varied by drawing together or spreading apart the cut-off plates. To accomplish this by the governor, the plates are operated by separate rods which pass outside the chest and connect to the ends of a small double-ended vertical lever, the center of which receives motion from the cut-off eccentric. The double-ended lever has attached to it a horizontal arm, which is operated to adjust the plates by a vertical movement derived from an adjusting screw on the governor.

The governor is driven by gear in the simple manner shown, so as to be reliable in its action, and is what is ordinarily called a "mill governor." The governor balls have a very slight movement, which simply causes a disk on an adjusting screw to be clutched to the wheels operating the governor in such a manner that the screw is turned in one direction by the engine when the balls rise, and in the other direction when the balls fall—thereby adjusting the plates by the power of the engine the instant the speed changes. The screw stops when the proper speed is restored, and the plates are held by it, in a fixed position, until a further change of speed takes place.

The advantages of this form of governor cut-off are, that it is simple in construction, positive and reliable in its operation, and, unlike any common governor, gives exactly the same speed throughout the full range of power and steam pressure.

For further information address the Novelty Iron Works, foot of East 12th street, New York.

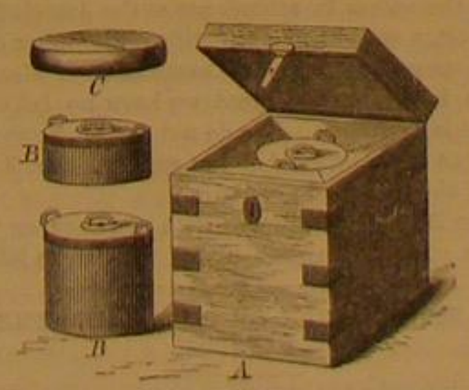
THE SELF-ACTING NORWEGIAN COOKING APPARATUS.

The announcement that the new experiment in co-operative housekeeping now on trial at Salem, Mass., has brought the Norwegian cooking apparatus into use as a means of transporting dinners, "all hot," from the co-operative kitchen to the respective co-operative tables of those who have joined in the experiment, has attracted special notice to this useful implement.

We gave a short notice of this device on page 346, Vol. XIX., but as many of our present readers may not have seen it, and much inquiry is now being made in regard to it, we will, at the risk of repeating ourselves to some extent, give an illustration and a more detailed description of the apparatus.

It is constructed in the most simple manner, of a wooden box lined with four inches of felt, in which the saucepans containing the food, previously boiled and maintained at the boiling point for five or ten minutes, according to the nature of the food to be cooked, are placed. The heated saucepans are covered with a thick felt cover, and, the lid of the box being fastened down, the rest of the cooking is done by slow digestion, no more heat being added.

The heated vessels containing the food will retain a high temperature for several hours, so that a dinner put into the apparatus at eight o'clock in the morning would be quite hot and ready by five in the afternoon, and would keep hot up to ten or twelve at night, because the felt clothing so completely prevents the escape of the heat; and as the whole is inclosed in a box, there are no currents of air to carry off any other heat by convection.



A is the box, lined with felt; B B the saucepans fitting into the box; C the felt cover, to be placed on the top of the saucepans.

The principle on which this cooking apparatus acts is that of retaining the heat; and it consists of a heat-retainer or isolating apparatus, shaped somewhat like a refrigerator, and of one or more saucepans, or other cooking vessels, made to fit into it. Whereas, in the ordinary way of cooking, the fire is necessarily kept up during the whole of the time required for completing the cooking process, the same result is obtained, in using this apparatus, by simply giving the food a start of a few minutes' boiling, the rest of the cooking being completed by itself in the heat-retainer away from the fire altogether.

DIRECTIONS FOR USE.—Put the food intended for cooking, with the water or other fluid *cold*, into the saucepan, and place it on the fire. Make it boil, and when on the point of boiling skim if required. This done, replace the lid of the saucepan firmly, and let it continue boiling for a few minutes. After the expiration of these few minutes, take the saucepan off the fire and place it immediately into the isolating apparatus, cover it carefully with the cushion, and fasten the lid of the apparatus firmly down. In this state the cooking process will complete itself without fail.

By no means let the apparatus be opened during the time required for cooking the food. The length of time which the different dishes should remain in the isolating apparatus varies according to their nature. It may, however, be taken as a general rule that the same time is required to complete the cooking in the apparatus as in the ordinary way on a slow fire.

The advantages of this apparatus are thus detailed by Herr Sörensen, the patentee, whose attention was first directed to the subject by the Norwegian peasants, who heat their food in the morning, and while away in the fields keep the saucepan hot by surrounding it with chopped hay:

1. *Economy of Fuel.*—Varies according to the length of time required for cooking the different sorts of food. For those requiring, in the ordinary way, only one hour's cooking, the saving is about 40 per cent; two hours, 60 per cent; three hours, 65 per cent; six hours, 70 per cent. In the case of gas being used, the saving would be greater still.

2. *Economy of Labor.*—A few minutes' boiling is sufficient. No fire is necessary afterward. The cooking pot once in the apparatus, the cooking will complete itself. Over-cooking is simply impossible, and the process of cooking is infallible in its result. The food will be cooked in about the same time as if fire had been continuously used But the food need not be eaten for many hours after the cooking process is complete; so that half-an-hour's use of a fire on a Saturday night, for example, will give a smoking hot dinner on Sunday.

3. *Portability.*—The weight of the apparatus, complete, varies from 18 to 50 lbs. The apparatus can, in proportion to its dimensions, be carried about with great facility, without interfering with the cooking process. By means of a large apparatus—for instance, following on a cart a detachment of soldiers on the march—it is possible to provide them with a hot meal at any moment it might be found convenient (as may be proved by official reports from the officers of the Royal Guard at Stockholm, in the possession of the patentee).

Again, fishermen, pilots, and others whose small vessels are not generally so constructed as to enable them to procure hot food while at sea, may easily do so by taking out with them in the morning an apparatus prepared before their departure. It is, in short, a thing for the million, for rich and poor; for the domestic kitchen, as well as for persons away from their homes. It cooks and keeps food hot, just as well when carried about on a pack-saddle, on a cart, or in a fisherman's boat, as in a coal-pit or under the kitchen table.

4. *Quality and Quantity of the Food Prepared.*—Where other plans of cooking waste one pound of meat, this apparatus, properly used, wastes about one ounce. The unanimous testimony of those who have used it pronounces the flavor of food cooked in this manner incomparably superior to that which is ordinarily produced.

5. *Simplicity of Use.*—One of the greatest advantages of this invention is, no doubt, its simplicity and practical application. There is no complication of hot-water or air pipes to retain the heat, no mechanical combination whatever for producing a high degree of heat by steam pressure; consequently there is no necessity for steam valves or other combinations which would render the use of the apparatus difficult and dangerous. Any person will, without difficulty, be able to use the apparatus to advantage after once having witnessed it in operation. No special arrangement is required in the kitchen for using the apparatus. Any fuel will do for starting the cooking.

6. In addition to all these advantages, the complete apparatus constitutes the "Simple Refrigerator" for the preservation of ice, which has attracted so much notice, and had such warm approval from medical men. It will keep ice in small quantities for many days.

THE SCIENCE ASSOCIATION.

CLASSIFICATION OF THE ELEMENTS OF MATTER.

Among the papers read before the American Association for the Advancement of Science, we notice an able one from the pen of Prof. Charles A. Seeley, of New York. The title of this paper was "The Classification of the Elements of Matter." In the introduction to this paper some points in the philosophy of classification were discussed, and a doubt suggested of the wisdom of creating classes of natural objects with confused and indefinite boundaries. The notion of atomicity was the foundation of modern chemistry, and was a part of almost every theoretical speculation on the subject. Various of the old groupings of the elements, on the basis of their physical properties, had been independently arrived at through the doctrine of atomicity. The elements had been divided into two kinds, viz., those of odd and those of even atomicity. Prof. Seeley was the first to observe that the elements of the two kinds which had corresponding or closely approximating atomic numbers were related in physical properties. In short, the elements are paired. Mr. Charles S. Peirce, of Cambridge, had greatly added to the illustration of the fact of pairing by representing in a diagram the elements in positions determined by ordinates representing the atomic numbers. The important conclusion of the paper was, that the various groupings of the elements by reason of physical properties were dependent upon certain numerical relations.

ACTION OF THE HUMAN HEART.

The general session of the evening of the 19th August was perhaps the most interesting to the general audience, partly because the proceedings were more generally and easily understood by those not skilled in scientific investigations, and partly on account of the rather sensational character of the experiments performed. On this occasion the physical peculiarities of the action of the human heart were clearly shown by the aid of a remarkable case of malformation of the thorax in a healthy living subject. Dr. Groux, a native of Hamburg, and at present a practicing physician in Brooklyn, N.Y., was born without the sternum or breastbone. Dr. J. Baxter Upham, of Boston, having been intimately acquainted for many years with Dr. Groux, has devised a number of ingenious experiments by which, in his case, the action of the heart is made to manifest itself both to the eyes and ears of persons situated at a considerable distance. It should be borne in mind that the action of the heart in Dr. Groux is perfectly normal and healthy, while the absence of the sternum renders it possible to make certain studies of the utmost importance, which are impossible in the case of the human being as ordinarily constructed. Dr. Groux's case has been treated of at length in various medical journals in Europe, but never before has it been brought in such a striking manner before so large an audience of scientific men. The mechanism of the heart is somewhat analogous to that of a double-action pump. In both cases the machinery, however perfectly it may work, makes some noise. Dr. Groux was able to show three distinct motions and sounds occurring successively, and a certain rhythm, in every beat of the heart. Dr. Groux also exercised the power, rarely bestowed and never used without great danger, of stopping at will, during a short period, the action of his heart. This was done this evening to the satisfaction of several medical men, one of whom was listening with the stethoscope at the chest, and two others feeling at the wrists for the pulse. For about twenty seconds the action of the vital organ in the frail chest of Dr. Groux completely ceased. Some years ago there existed an individual who was wont to experiment with himself in this manner, and who finally perished through being unable to resume the ordinary conditions of human existence. Dr. Upham, so far from encouraging his friend, Dr. Groux, in the repetition of this perilous experiment has earnestly entreated him never to make the venture again. Some years ago Dr. Groux, having made up his mind to travel in various cities of Europe and America, caused Rufus Choate, the renowned lawyer, to draw up a will making over his body, in the event of his death, to the surgeons for dissection. Portions of this will, which is a long document composed in Mr. Choate's happiest vein, were read to the great delight of the audience. The original draft, in the inimitable handwriting of Mr. Choate himself, was also exhibited. The experiments and explanations specially relating to Dr. Groux were given with great clearness by that gentleman, who is a regularly graduated physician. It is clearly of great advantage to science that this rare malformation occurs in one who is so well qualified to observe the obscure vital processes which it affords an opportunity of studying.

Dr. Upham contributed a valuable paper on the action of the heart, describing its anatomical position, appearance, and action. Our knowledge of its position had been improved by studies of the case of Dr. Groux. In death the relaxed muscles of the corpse caused the heart to fall somewhat from the place it naturally holds in life. The sounds of pulsation were fully described, as well as the intervals between the successive portions of the pulsation in the auricle, ventricle, and aorta. These intervals have been measured in thousandths of of a second by the chronograph, a valuable invention of the late Prof. Bond, of Harvard University.

At the conclusion of his lecture Dr. Upham gave some remarkable experiments. The beatings of the hearts of several of the physicians and patients of the City Hospital, in Boston, were automatically transmitted by telegraph from the hospital to the hall in Salem. By means of the magnesium light these pulsations were made to manifest themselves to the sight by the vibration of a beam of light on the wall of the darkened room. A regular pulse of 60 per minute was first sent. Then was transmitted the healthy pulse of an excited person, regular, but having a rapidity of 90 per minute. But the most interesting cases were those of a patient suffering from pneumonia, whose pulsations numbered 118 per minute, and that of another afflicted with organic disease of the heart. The irregularity of the beats in this latter case was vividly impressed on the mind by the sounds of the instrument. Prof. Farmer, the well-known electrician, assisted by a skillful operator from Boston, had charge of the electrical arrangements in Salem. Dr. Knight was in charge at the hospital in Boston. The Franklin Telegraph, too, gave the free use of their lines for the experiments, which were successful to a degree even surpassing the anticipations of Dr. Upham. It needs only to be added that these experiments are entirely new, and have their origin in Dr. Upham's studies for making the motions of Dr. Groux's heart perceptible to those in distant parts of a lecture room.

THE SEXES OF PLANTS.

The "Sorosisters," as a humorous friend calls the members of the Sorosis, may find comfort and support in a paper read by Professor Meehan. If male blossoms only grow in the weakest stems while the stronger stems produce female blossoms, does it not plainly show that the national weakness usually ascribed to females of the human family is utterly a mistake. It cannot be for a moment supposed that nature has different laws in the vegetable kingdom from those which govern the animal kingdom; *ergo* the weakness of woman must be artificial—the result of the dire oppression to which she has been for ages subjected.

Prof. Meehan referred to some discoveries published by him last year, showing that in plants of the pine family the greater the vigor of the axis or stem growth the greater was the adhesion of the leaves with the stem. Norway spruces only produced cones on the very strong branches. As they grew weaker they ceased to produce these, and only male ones followed. In the larch there was the same phenomenon. When the tree came to a bearing age the most vigorous shoots had the leaves adherent to the stems; only green acorns (commonly called leaves) appeared from the apices. As the shoots weakened they lost power of axial development, and the leaves the power of producing acorns, and true leaves grew in verticils or spurs. As these gradually grew weaker, they produced female flowers, and ultimately, when they became much weakened by shade or by a diversion of food into other channels, they produced male flowers. This was the last expiring effort of life—to produce male flowers and die. In the *amentaceous* plants a similar law of vigor in connection with sex prevailed. In the oak, the male flowers appear as soon as the leaf buds open in spring, but the female flower only appears after the shoot has achieved some vigor. In all other plants of this family—in the alder, hazel, walnut, hornbeams, etc., the male flowers were always in the weakest direction, the female in the strongest. So in the sedge grasses (*Cyperaceæ*), the apex was not always the most vigorous, but when it was the female flowers were there. Vigorous growth was only one form of vitality. Power of endurance was another. The hardiest individuals among Norway spruces pushed first into leaf, and these were far more productive of female flowers. Hermaphrodite flowers were not so good as those which had the sexes in separate flowers for observing this law, but yet abnormal forms showed the existence of the same law. Sometimes they showed a tendency to become pistillate or staminate, very double or very single; with the addition of petals, stamens, or other indications of male influence, came weakness. Double flower plants were difficult to root. Variegated plants were not easy to keep; on the other hand the apetalous violets and other tendencies in a female direction were always accompanied by increased vital tendencies.

The conclusion the speaker arrived at was that it is the highest types of vitality only which take on the female form; and suggested that probably the same laws prevailed in the animal world, but contented himself with the bare suggestion. The essayist merely presented a great number of facts, offering them not as an established theory, but as one of great probability and inviting further investigation.

THE CONSTITUTION OF MAN.—AINOS.

Among the *savans* in attendance at the Association is Clinton Rosevelt, a well-known scientific philosopher of this city. He read a paper upon the "Constitution of Man;" but beyond this brief announcement we have no inkling of the scope of this document. We do not doubt, however, that it was an able *eclaircissement* of the subject. Mr. Rosevelt is a student of the profound mysteries.

Professor Beckmore followed with a paper on "Ainos, or Hairy Men of Jesso, Saghalien, and the Kurlie Islands."

ON THE DISTRIBUTION OF COPPER IN THE ANIMAL KINGDOM.

[Translated or the Scientific American from "Aus der Natur."]

The presence of traces of copper in the blood of the lower animals has been for years an undisputed fact among chemists. In the blood of the higher animals, however, with few exceptions, no copper has been detected until lately. Wackenroder, for instance, discovered this metal in the blood of the duck, but not in that of the ox, the sheep, or the chicken. Its presence in the blood and in the muscle of the flesh of man has been asserted as often as it has been denied, and now, as there is no doubt that it sometimes occurs in the bile, and bile stones, and the liver of man, its existence in these organs is still considered to be merely accidental, the more so as it is well known they retain poisonous substances more than other organs. Some years ago, Mr. Ulex, in Hamburg, was led to search for copper in various animals by the following accident. From the 17th to the 19th of May, 1865, a dozen wild beasts died suddenly in the zoological garden in Hamburg. There being suspicion that they had been poisoned, a chemical examination of the intestines was undertaken. However, no well-known poisons could be discovered, except copper. The beasts had been fed with the flesh of a horse the day before, and, there being still some left, it was also subjected to examination. There being copper found, Ulex expected to be able to conclude his researches by the proof of the absence of copper in the flesh of a healthy, freshly-killed horse. To his great surprise, however, this metal occurred also in this case, indeed, in the most undoubted manner. A piece of beef having been examined with the same result, it gave rise to the supposition of a general distribution of copper in the animal kingdom. As the tests for copper are very easy and simple, as well as exceedingly sensitive, if properly applied, the respective investigations were extended by Ulex to animals of various zoological classes. The reagents employed were tested for copper in every case, and rejected if containing any. Ulex proved the existence of this element in the yolk of eggs, and in bath sponges. The quantity ranged from 0·01 to 0·10 per cent. Among the mammalia, it was found in the stomach and intestines of the European and Canadian lynx, and in those of some species of the leopard, jackal, and repeatedly in the flesh of horses and cattle. It was met with in Liebig's meat extract, which, as is well known, contains the soluble portions of beef in a concentrated form. Moreover, it was discovered in the breast of a "crick duck," in the yellow and white of an egg, more so in the latter than in the yolk. Among amphibials, in the geometrical tortoise, the viper, and frog. Among fishes, it was met with in the eel and torsk, and among animals of the lower classes, copper was met with in the following species: In *Crangon vulgaris*, the South American bird-catching spider, *Scolopendra Italica*, in the Spanish fly, the earth-worm and the ascaries, in the edible vine-snail, in sea stars, in the thick-hided echinanthus, and in the bath sponge. It is thus seen that copper was detected in every case where it had been searched for; this having been the case with accidentally chosen animals of various zoological classes, it may rightly be concluded that the metal copper, like iron, is of a general distribution in the animal kingdom. From this it follows that copper must also be present in plants, in the ground, and in the sea. Indeed, copper was detected in plants by Meissner and John more than fifty years ago, and later it was ascertained by Sarzeau to be present in more than five hundred vegetable species. In the earth, copper has been repeatedly detected, and so in the water of the ocean by Durocher, Malaguti, Field, and Piesse. If copper is found in the vegetable fiber, it follows that it must also be present in its industrial products. In order to ascertain this, Ulex selected a material that is daily employed by chemists, and, on account of its purity, highly esteemed by them, namely, Swedish filtering paper. Upon analysis it was found that ten grains of it yielded 6·03 grains or 6·3 per cent of ashes, from which a piece of copper half the size of a pin's head could easily be obtained. Charcoal also yields a cupreous ash, and as both paper and charcoal are made use of in the analyses spoken of, it might be suggested that the copper of these substances got into the analyzed materials, where, of course, they would have been found. Yet, this reaction has its limits. If it is possible to detect copper in ten grains of paper, and in a hundred grains of charcoal, it is not possible to find it in 0·25 grains of paper, or 0·1 grain of charcoal, which are the quantities used in each analysis. Besides, copper has been discovered in animal tissues without the use of either paper or charcoal. The above mentioned facts are certainly not without importance to physiology, judicial medicine, and pharmacy, but it is to be hoped, that in following them up, more light will be thrown upon this interesting topic.

Fell's Railway over Mont Cenis.

Dr. H. L. Sellers, of Natchez, Miss., writes us that the form of railway used on Mont Cenis, a notice of which was made in our issue of June 12th, was originally invented by his brother, G. E. Sellers, formerly of Philadelphia, who invented and patented a locomotive, operating exactly like the one in use on the road mentioned, about the year 1835.

Our correspondent perhaps feels aggrieved at what seems to him a transfer of the honor of this invention to Mr. Fell, but we have never understood that the invention was claimed by that gentleman, but, on the contrary, believe it has been understood by him and others who know the history of the matter to be an American invention. "Honor to whom honor is due," is a precept sometimes disregarded by eminent men, but we think in this case no honor has been claimed by Mr. Fell upon the ground of priority or originality in the form of either locomotive or track. He was the first to build and operate a railway on this plan.

How to Catch Rats.

The following is said to be a cheap and effective way to catch rats: Cover a common barrel with stiff, stout paper, tying the edge round the barrel; place a board so that the rats may have easy access to the top; sprinkle cheese parings or other feed for the rats on the paper for several days, until they begin to think that they have a right to their daily rations from this source; then place in the bottom of the barrel a piece of rock about six or seven inches high, filling with water until only enough of it projects above the water for one rat to lodge upon. Now replace the paper first cutting a cross in the middle, and the first rat that comes on the barrel top goes through into the water, and climbs on the rock. The paper comes back to its original position, and the second rat follows the first. Then begins a fight for the possession of the dry place on the stone, the noise of which attracts the others, who share the same fate.

THE STORY OF A BOULDER.

The graduating class of Michigan University has placed in the campus, at Ann Arbor, an immense boulder. Dr. Winchell, at the solicitation of the class, gave the following history of this gigantic "specimen :"

THE BOULDER OF 1869.

This stranger to our precincts, appropriated and adopted by the class of 1869, has traveled hither from the far north. It is probable its home, for many ages, was upon the northern shore of Lake Huron. There it was wrenched from its ancient fastenings by a geological convulsion, seized in the grip of the glacier, borne three hundred miles over obliterated river and lake, and relinquished, at last, within sight of the future temple of Western learning. Here it has lain for perhaps a hundred ages, awaiting the advent of the class of 1869, and its final installation in the University as voiceless lecturer on the history and mutations of the world.

This traveled rock, to those who can enter into communion with it, recites a tale of varied adventure. It is a rock of much more than usual interest. It is a rock of rocks. It is not the stone of which the contemptuous could say, "A stone's a stone and nothing more." It is an epitome of petrology ; it is a lithological museum ; it is a geological science converged to a focus ; it is a table of contents of the book of nature. Let us look into it.

This interesting rock is a heterogeneous conglomerate, containing about seventeen cubic feet, and weighing, consequently, about three thousand pounds. Whatever angularities it possessed when first venturing from home, have all been worn off by contact with the world. On one side may be discovered not only the polish due to the action of the glacier, but also one or two distinct furrows scored into the flinty substance of the rock.

The constituents of the conglomerate vary in size from grains of sand to fragments four or five inches in diameter. Most of these are themselves rounded and worn by some ancient conflict with geologic forces ; but a few preserve still a rounded angularity. The constituent pebbles present a lively assortment of colors, from black to greenish blue, drab, rose-color, red, and white. The surface of the boulder intersects these various-colored pebbles without regard to hardness, quality, or complexion. It thus presents a diversity of colors worthy of some of the dashing patterns of modern calicoes. Indeed this rock, long familiar to all travelers over the "middle Ypsilanti road," has always been known as "the calico rock," and it is not impossible that this name gave it a charm in seniors' eyes. In studying carefully the composition of the boulder, I have recognized no less than twenty-one varieties of rocks and minerals: 1. Chlorite rock, a soft, homogeneous, blueish-green material, in fragments an inch or less in diameter; this is also called melaphyre by some writers. 2. Chlorite schist, in somewhat angular slaty fragments, on one side exposing a layer of about a square foot in extent. 3. Chloritic scales, or white crystalline chlorite. 4. Mica (muscovite) in scattered scales. 5. Argillite, of a reddish color, in limited amount. 6. Red jasper in small quantity. 7. Black jasper in smaller quantity. 8. Orthoclase in detached broken crystals, and as constituent of numerous pebbles. 9. Porphyrine, in numerous fragments of a homogeneous, reddish color. 10. Petrosilex, moderately abundant, and very hard. 11. Glassy quartz in detached fragments of the size of a marble and less. 12. Rose quartz. 13. Smoky quartz. 14. Silicious schist. 15. Granular Quartzite. 16. Quartzose grit. 17. Quartzose conglomerate. 18. Granulite, with abundant deep red orthoclase. 19. Granulite, with abundant pale red orthoclase—the last two and the second named constituting half of the bulk of the boulder. 20. Gneiss, in limited amount. 21. Pyroxenic gneiss in greater abundance.

The boulder illustrates, moreover, the phenomena of—1. Massive structure. 2. Schistose structure. 3. Gritty structure. 4. Pudding stone. 5. Semi-breccia. 6. Glacial polish. 7. Glacial grooves. 8. Glacial transportation.

Here are not less than twenty-nine geological phenomena set forth by the teaching of a single stone.

But this is not all. It is a revelator of unseen and impalpable facts. It speaks a history. In contemplating this lost rock we are led to think of the modern epoch, during which it has lain exposed upon the surface of the earth, beaten by a thousand wintery storms, the witness of the life and history of the savage tribes which pursued their game or fought their battles among the hills and vales of the "beautiful peninsula." And then we think of the time when it was first transported to this region, and picture to ourselves the wrestling and the crashing of the great glacier along a journey of three hundred miles, and continued over a period of a thousand years or more. And next, we ask where the glacier picked it up, and under what circumstances it found our boulder existing. It may have wrenched it from a projecting crag ; it may have found it a fragment torn by an earthquake convulsion from its parent bed. But the parent bed, where was that? What had been its history? There was, and probably still remains, an extensive formation of rock, of which the glacier has brought us this specimen. There was an older time, then, when the powers of geology in their untamed energy were engaged in bringing together from twenty shores the materials which were to enter into the constitution of that formation. Who shall discover the shores whence they were gathered? They are the ruins of a continent which nourished the growth even of the eozoic continent—the growth even of the *germ* of North America. Into the dim horizon of eternity sink the desolate undiscovered shores of that first-born land. But it existed. Nor was that even the beginning. Imagination is called upon to take another flight into the retreating ages of terrestrial history. This granulite, this gneiss, this chloritic schist—these are themselves products of sedimentary deposition which went forward during an age anterior to the time when these rocks were bluff-bound shores yielding debris for our conglomerate. If the constituents of these were not themselves ground from some still more ancient beach, they show at least that old ocean existed, and was even then occupied in laying down courses of sediment —even of pure chemical precipitates—which were destined to be rewrought into rocks that should stand to the age of man.

Perhaps the visible testimonies of our boulder go no further. But they have given thought an impulse which refuses to be arrested even at this limit. She demands what sort of a sea-bottom that primeval ocean rested upon. Was it also a bed of rock that had been accumulated in an ocean? If so, upon what sort of a bottom did that older ocean rest? There must have been an ocean, in the history of the world, which rested on a floor of refrigerated lava. There must have been a *first* ocean. To deny it is to deny that our globe has been in progress of cooling from a natural beginning. To deny it is to assume that its history began in the midst of an evolution that, under the laws of nature, is as likely to have had antecedent as subsequent terms. It is to deny that the earth has been cooling as long as physical laws render possible. It is to *assume* that it was created in mid career instead of at the commencement of it. It is a suicide of the positive philosophy which makes the denial, since, by denying the existence of an antecedent molten condition of the globe the positivist postulates a creation at a point where creation was not necessary —obtrudes the ever incomprehensible miracle of creation at a juncture when he must perform another miracle by interrupting the spontaneous course of nature.

So builds reason on the foundation stones bound up in this boulder. Even from this rock we mount into the past eternity, and grope for that beginning which was the source, the fountain—*bereshith*—whence flowed naturally the stream of events which we trace, by the lamp of science, down through the geologic ages, and witness, even to-day, rushing like a mighty tide before our eyes, and bearing man himself along, with all his works, into the abyss of future years.

And when thought reaches this limit she finds herself confronted by an adamantine wall. Beyond this is only Omnipotence ; and while the deep utterances of the soul of man speak ever of primary causation, reason discovers here that primary cause. This is the response of science to the intuitions of the soul. This is the triumph of the soul when science falls disabled. This is the harmony between nature and mind ; this is the unison of philosophy and faith.

Thanks, from the depths of the heart, that this ancient, war-worn boulder, smitten by the wand of science, has opened such a permanent fountain of God's eternal truth.

The Fire Alarm for New York City.

A new fire alarm for New York city is now in process of construction, the details of which are important as foreshadowing a general improvement in the methods now employed in giving notice of fires in most of the large cities in the United States.

The system will differ in many respects from any system of fire alarm now in existence, but will combine all the best features of the telegraphic fire alarms now in use in other cities, the external apparatus to be made in a tasty and ornamental style.

The Central Office of the new system will be established in the building known as Firemen's Hall, in Mercer st., and is to be provided with the following appliances :

A sufficient number of self-acting, paper-registering apparatuses (with or without accompanying "relays," as may be deemed necessary), attached to the signal circuits, whereby alarms for fire received may be printed upon paper, to be detached and filed away for reference ; a test indicator for each circuit, whereby its general condition may be ascertained at any time, and, in addition, apparatus and appliances, to be on the principle of that used in testing the Atlantic Cable, enabling the operators to examine and test for faults, breakages, and the usual disturbances to which telegraph lines are subject; an "electro-magnetic watch clock," by means of which the tests made by the operators in charge, at stated intervals during the twenty-four hours, may be recorded ; one or more alarm bells, so arranged that a break in the continuity of any of the several circuits shall be indicated, and notice given to the operator ; an apparatus for automatically sending out to the various alarm stations the signal number which may be required, and so arranged that, being capable of being set to any number, from 1 to 999, when thus set and started into action, its circuit wheel, set to the required number or alarm, acts by proper appliances, so that the alarm is sent out on each circuit successively, and with equal and great force, and in so rapid a manner that the entire number of alarm stations shall receive one blow on the gong within one and one half seconds, although the force of the battery is thrown on only ten circuits at one time. One such apparatus shall also be attached to the "signal station" circuits, and in like manner as above, the "alarm" shall be tapped on each or all the signal boxes ; also, one or more switch-boards, with sufficient switches, circuit-breaking keys, and other appliances as shall permit alarms being sent on one or more of the several circuits as may be desired.

All of the machines and other attachments and appliances are to be of the finest workmanship, elaborately finished and mounted, and so designated in all their multitudinous functions that the operator in charge shall be able to handle them with celerity, and have the fullest and most complete command over all the circuits at all times. Communication with the central office of the Police telegraph will be established by means of improved "dial machines," so arranged as to be capable of expressing in a comprehensive and rapid manner the peculiar style of message relating to fires, which are usually forwarded to and from that office. The chief innovation of the new system, and the one in which a belief in its usefulness is mainly placed, is in the alarm stations scattered throughout the city, but conforming as nearly as possible to the code of signal stations now in use.

The stations will be placed nearer together in the upper part of the city, and the time to be gained in giving notices of fires is to be found in the fact, that from each one of these stations an alarm can be given, which is not now the case. At each of these stations is to be placed a mechanical gong ringer, so constructed that the power of a single cup of small capacity shall start the machinery, which strikes a gong or bell of about twenty pounds weight, and the machine is constructed to work upon either an open or closed circuit. The machine, with the weight, will be inclosed in a black walnut case with glass front—the door having a good brass tumbler lock and one key—and securely fastened to the wall of the station in such part of the building as may be indicated. The case is so constructed that the weight can be wound up without the case being opened, and an indication given when the weight is run down. Each is supplied with a good lightning arrester, and a telegraph key, and the wires, leading from the poles to and from these machines will be suitably insulated and properly protected.

Each "street box" will be constructed of iron, roof-shaped, with an outer and an inner case, containing an automatic signal machine, which is wound up and started into operation by pulling a button or similar device ; the door of the outer case to be opened to obtain access to the button. The inner case is to contain the automatic machine—itself securely incased in an iron box—which is to have its circuit-wheel cut corresponding to the station number, and must be capable of signaling that number with perfect exactness and uniformity; the machines on each circuit to be so speeded as to give a slightly different rate of signal, so that when two or more signals are to be received at the Central Office, they may be readily distinguished. This machine is to be of the finest construction, and capable of running with a one-ounce weight attached to the handle. The inner case is also to contain a bell magnet, or electric alarm bell, which will sound sufficiently loud to be heard ten feet from the boxes when closed, a signaling key, and a good lightning arrester. The outer door is to be provided with a strong brass tumbler lock, with five keys. The inner door, to which is attached the button or device for starting the machinery, will also be provided with a strong brass tumbler lock and one key. All the locks of the outer cases are to be uniform in style and wards. The keys of these boxes are to be in the charge of the policemen and firemen, except one for each box, which is to be left at a place to be stated by a plate on the box itself, so that it can be accessible at all hours to any person discovering a fire. The boxes are to be placed, whenever practicable, in such public places as hotels and drug stores, which are open all the time, and are uniformly to be made long and narrow, so that they will not be cumbersome when placed upon the telegraph poles, as in many parts of the city they must be.

Bubbles of Mercury Floating on Water.

When the lecture room of a chemical laboratory is provided with a sufficient supply of water under strong pressure, it is possible to make, and exhibit there an experiment, which, owing to a deficient pressure of water in such rooms, has been almost unnoticed. The experiment is the following: Under an ordinary water tap, the opening of which has from 10 to 12 m. m. diameter, a large sized porcelain basin is placed, containing from 15 to 20 kilos. of mercury ; the water tap being suddenly opened, a strong flow of water is caused to fall into the basin at a hight of from 8 to 10 centimeters from its bottom. On turning off the flow of water again, it will be seen that on the surface of that fluid there float about bubbles of mercury, usually exhibiting a diameter of only one centimeter, but occasionally some are found of two or three times that size. As a rule these bubbles are very ephemeral ; now and then, however, it happens that some may be caught, along with a quantity of water, in a small beaker glass, and, on the mercurial bubbles bursting, it will be seen how very small a quantity of mercury these bubbles consist of. Professor Hofmann mentions that he saw this experiment first exhibited in the lecture room of the Royal College of Chemistry, London, when, some twenty years ago, Professor Melsens, from Bruxelles, was on a visit there. The pressure of water at the lecture room just named is from 10 to 12 meters; in the new laboratory of Berlin University the pressure of the water circulating in the tubes and pipes is from 20 to 25 meters.

A New Pyrometer.

Everybody knows the difficulties which stand in the way of exactly estimating high temperatures. The best pyrometers we have had hitherto can only be supposed to give approximate results, and some of them may be very wide of the truth. It is now announced that M. Lamy has devised an instrument which shows within two or three degrees Centigrade the temperature of a furnace heated up to redness, and gives its indication at a distance from the furnace, so that at a porcelain factory, for example, a manager can sit in his office and see the temperatures of all the furnaces in his establishment. The instrument is as simple as it seems to be efficient. It is merely an iron retort, containing marble, the neck of which communicates, by means of a narrow tube, with a needle moving over a dial plate. As the heat rises, the marble is decomposed, and carbonic acid set at liberty. A special contrivance measures the tension the gas arrives at, and as this has a direct relation to the temperature, the measure of the one is made the measure of the other. Up to a certain point, we have little doubt this instrument may be relied upon.

The Reef-building Corals.

The variety of compact and branching corals far exceeds description: 120 species are inhabitants of the Red Sea alone, and an enormous area of the tropical Pacific is everywhere crowded with the stupendous works of these minute agents, destined to change the present geological features of the globe, as their predecessors have done in the remote ages of its existence.

Four distinctly different formations are due to the coral-building polypes in the Pacific and Indian Oceans: namely, lagoon islands or atolls, encircling reefs, barrier reefs, and coral fringes, all nearly confined to the torrid zone.

An atoll is a ring or chaplet of coral, inclosing a lagoon, or portion of the ocean, in its center. The average breadth of that part of the ring which rises above the surface of the sea is about a quarter of a mile, often less, and it is seldom more than from six to ten or twelve feet above the waves; hence the lagoon islands are not visible, even at a very small distance, unless when they are covered by the cocoanut palm, or the pandanus, which is frequently the case. On the outside, the ring or circlet shelves down for a distance of one or two hundred yards from its edge, so that the sea gradually deepens to about twenty-five fathoms, beyond which the sides of the ring plunge at once into the unfathomable depths of the ocean, with a more rapid descent than the cone of any volcano. Even at the small distance of some hundred yards, no bottom has been reached with a sounding line a mile and a half long. All the coral in the exterior of the ring, to a moderate depth below the surface of the water, is alive; all above it is dead, being the detritus of the living part, washed up by the surf, which is so heavy on the windward side of the tropical islands of the Pacific and Indian Oceans, that it is often heard miles off, and is frequently the first warning to seamen of their approach to an atoll.

The outer margins of the Maldive atolls, consisting chiefly of millepores and porites, are beat by a surf so tremendous that even ships have been thrown by a single heave of the sea, high and dry on the reef. The waves give innate vigor to the polypes by bringing an ever-renewed supply of food to nourish them, and oxygen to aerate their juices; besides, uncommon energy is given and maintained by the heat of a tropical sun, which gives them power to abstract enormous quantities of solid matter from the water to build their stony homes, a power that is efficient in proportion to the energy of the breakers which furnish the supply.

On the margin of the atolls, close within the line where the coral is washed by the tide, three species of nullipores flourish; they are beautiful little plants, very common in the coral islands. One species grows in thin spreading sheets, like a lichen; the second in strong knobs as thick as a man's finger, radiating from a common center; and the third species, which has the color of peach blossom, is a reticulated mass of stiff branches about the thickness of a crow's quill. The three species either grow mixed or separately, and although they can exist above the line of the corals, they require to be bathed the greater part of each tide; hence, a layer two or three feet thick, and about twenty yards broad, formed by the growth of the nullipores, fringes the circlet of the atolls and protect the coral below.

The lagoon in the center of these islands is supplied with water from the exterior, by openings in the lee side of the ring, but as the water has been deprived of the greater part of its nutritious particles and inorganic matter by the corals on the outside, the hardier kinds are no longer produced, and species of more delicate forms take their place. The depth of the lagoon varies from fifty to twenty fathoms or less, the bottom being partly detritus, and partly live coral. In these calm, limpid waters the corals are of the most varied and delicate structures, of the most charming and dazzling hues. When the shade of evening comes on, the lagoon shines like the Milky Way, with myriads of brilliant sparks. The microscopic medusæ and crustaceans, invisible by day, form the beauty of the night, and the sea-feather, vermilion in daylight, now waves with green, phosphorescent light. This gorgeous character of the sea-bed is not peculiar to the lagoons of the atolls; it prevails in shallow water throughout the whole coral-bearing regions of the Pacific and Indian Oceans.

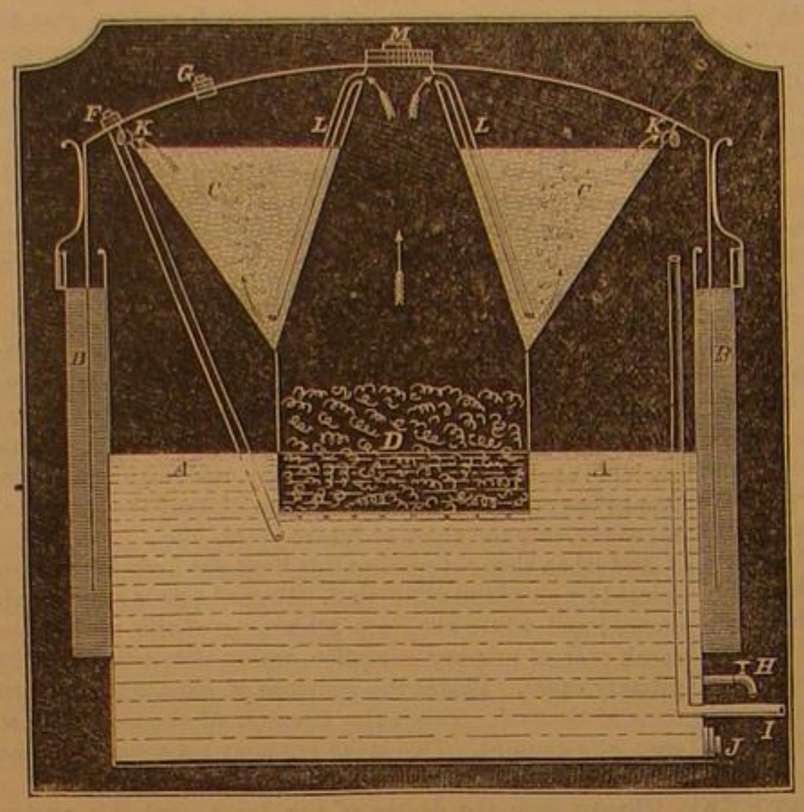
Encircling reefs differ in no respect from the atoll ring, except in having islands in their lagoons, surrounded also by coral reefs. Barrier reefs are of the same structure as the atoll rings, from which they only differ in their position with regard to land. They form extensive lines along the coasts, from which they are separated by a channel of the sea of variable depth and breadth, sometimes large enough for ships to pass. A very long one runs parallel to the west coast of New Caledonia, and stretches for 120 miles beyond the extremity of the island. But a barrier reef off the northeastern coast of the Australian Continent is the grandest coral formation existing. Rising at once from an unfathomable depth of ocean, it extends for 1000 miles along the coast, with a breadth varying from 200 yards to a mile, and at an average distance of from 20 to 60 or 70 miles from the coast, the depth of the channel being from 10 to 60 fathoms. The pulse of the ocean, transcendently sublime, beats perpetually in peals of thunder along that stupendous reef, the fabric of almost microscopic beings.—*Mrs. Somerville.*

An Old Map of Pittsburgh.

By the kindness of Mr. A. T. Haumann, Civil and Mining Engineer, of Pittsburgh Pa., we are in receipt of a map of Pittsburgh as it was in 1795. It is a very interesting document, and shows the exact position of the fortifications and barracks, of historical importance in connection with the early frontier wars of this country. The years which have since elapsed have made immense changes in the appearance of the town. At the period mentioned the sky was occasionally clouded by the smoke of artillery; now it is almost constantly veiled by the smoke of its manufactories, and its atmosphere resounds with the din of giant industries. Mr. Haumann will please accept our thanks. The map is photographed, and we presume may be obtained on application to Mr. Haumann at 130 Smithfield street, Pittsburgh, Pa.

APPARATUS FOR GENERATING ILLUMINATING GAS FROM THE LIGHT HYDROCARBONS.

The many obstacles in the way of making illuminating gas in portable apparatus have been very serious drawbacks in the successful operation of most of those heretofore offered to the public, the reasons being that the question is partly one of a chemical nature, and inventors, for the most part, mechanical people. Chemists rarely apply discoveries in a practical form, and mechanics are not sufficiently versed in the science to give it mechanical shape. This question requires a combination of the two sciences. Numbers of machines of all kinds have been made for making gas by passing atmospheric air through one of the volatile hydrocarbons; but owing to the fact that air does not combine with the vapor, together with other causes of failure, most of them have proved worthless, the vapor condensing in the pipes of the building, and choking up the same when they reach the temperature of 40° Fah.



We are now called upon to notice an invention which the inventor claims has none of the objections which may be brought against many which have preceded it. The engraving is a vertical section of an apparatus invented by Mr. C. F. Dunderdale, of 90 Wall street, New York city, for generating hydrogen gas by immersing scraps of iron shavings into diluted oil of vitriol with water, as shown at D in the engraving. The hydrogen rises therefrom, as shown by the arrows, and enters the pipe, L, in a heated state, passes down the same, and rises through a hydrocarbon contained in a compartment as seen at C. Here combining with the vapors it passes out through valves at K into the holder, which, having its edges sealed with water, B, rises, and if the gas is not being used it lifts a basket out of the dilute acid containing the metal scraps, which then remains inactive until the gas is used, when it again begins to generate as fast as used. The gas formed is carbureted hydrogen, a rich and powerful illuminating agent. It cannot be set on fire in its pure state, and the apparatus is therefore non-explosive. It is burnt in the smallest sized common gas jets like coal gas, and the inventor assures us costs less than half the price of coal gas as charged by the New York gas companies. He further asserts that it only requires from one third to one fifth the quantity that is required of coal gas to give the same amount of light. The machine being automatic requires very little attention. F, G, H, I, J, and M are caps and pipes for feeding the machine and drawing off the gas and contents of the machine when necessary. The salt (sulphate of iron) precipitated in the bottom of the machine is valuable, being largely used in dyeing, tanning, ink making, etc., and if saved and sold will, it is claimed, sell for as much as the whole cost of the gas.

The apparatus is made of material that is not affected or injured by the presence of the acid, and will last for years, and admit of a comparative low cost.

This will interest all gas consumers. Full particulars and information relating to it can be had by addressing the inventor and manufacturer as above.

In our last number we alluded to the serious want of water in Philadelphia. There is water enough it seems in the river, but it has heretofore been made to pump itself up by turning turbine wheels, and the process wastes ten or twelve gallons for every one made practically available. Plans are maturing for the construction of permanent steam pumps, so as to prevent a recurrence of the alarming dearth of water under which the greater part of the city is now laboring. All the steam fire-engines of the city have been called into requisition to pump water into the Fairmount reservoir. Two of them are on duty at a time, and their united efforts throw over 1,000,000 gallons into the reservoir in twenty-four hours.

Method of Detecting Poisonous Gases---The Gasophaner.

The *Pioneer*, England, states that a discovery has been made by an officer, which, if the results on a large scale are at all commensurate with the experiments made on a small one, may prove of great value in giving a timely indication of the approach or presence of that poisonous state of the atmosphere which is generally believed to precede cholera and other epidemic diseases.

The gasophaners, or poisonous gas indicators, as the discoverer calls them, are easily and cheaply made. A piece of fused boracic acid, the size of a walnut, from which the water of crystallization has been expelled, is heated to redness in chlorine, or has dissolved in it while hot a small quantity of common salt, care being taken that there is not sufficient soda—1% per cent—to convert the boracic acid into borax, which would spoil the effect. The red-hot lump of boracic acid thus charged is blown with a common glass-blower's tube into a thin glass ball or bulb, about the size of a small hand-lamp shade, and the gasophaner is ready for use. When first made, the glass is clear, with beautiful iridescent colors, due partly to the thinness of its sides; but left for a time, shorter or longer, according to the amount of moisture in the atmosphere, in normal breathing air, it becomes covered or clouded with a light blue film (due chiefly to the carbonic acid gas of atmosphere), which, combined with the iridescent colors beneath, has an opaline or pearly luster. On bringing the clouded gasophaner carefully to the flame of a spirit lamp, this film instantaneously vanishes, leaving the glass of that part again clear and shining. The delicacy of this test is so great that, although by breathing on the newly-made gass, the film may be much more rapidly formed than by mere exposure to the atmosphere, an approach to the spirit lamp flame will no longer drive off the carbonated compound formed, on account of the impure gases contained in breath. At the same time, carbonates thus formed from the breath of a child, or of an extremely healthy person, vanish precisely as the aerial ones do on application of gentle heat. Held over a solution of ammonia, the air carbonate will not form, except on the upper part, where the ammoniacal gas has less action; but if held so that the breath may mix with the ammoniacal gas, a thick white cloud of carbonate of ammonia without opaline luster, covers the gasophaner. This cannot be driven off by heat, but froths up on an approach being made to the lamp flame. But the most remarkable indication given by the gasophaner is when it is held over a solution of sulphureted hydrogen. The gasophaner immediately becomes pitted, as it were, with small-pox, on the surface next the gas; and these spots, on being examined with a microscope, are found to be round radiated crystals, the center or nucleus of which soon bursts into a hole. They are white by transmitted and dark brown by reflected light. Nitride of boron gave exactly similar crystals as the chloride, and so did pure boracic acid. These crystals, therefore, are presumed to indicate a combination of boron with hydrogen a fact hitherto unknown to chemists. The gasophaner can be re-heated and re blown as often as required.

American Locomotive Boilers.

It is impossible, says *Engineering*, for an English engineer to read the records of American boiler explosions without being struck by the very large number of failures of locomotive boilers which occur annually on the other side of the Atlantic. In this respect the American records form a strong contrast to those of explosions in this country. Here the number of locomotive boiler explosions seldom exceeds three or four per annum, and considering the large number of locomotives now at work in the United Kingdom, locomotive boilers may be said to possess a greater immunity from explosion than almost any other class. To a great extent, this is, no doubt, due to the fact, that locomotive boilers are, almost always, worked under skilled superintendence, and subject to frequent inspection; but it is, also, due to their being, with but few exceptions, well constructed, in the first instance, and properly proportioned for the work they have to perform. In America, locomotive boilers, although under quite as skilled superintendence as our own, are yet more liable to explosion from the fact of their having generally less superfluous strength when new than would be considered necessary by our railway engineers. American locomotive superintendents use 5-16 and 3-8 inch plates, where we should use 7-16 or 1-2 inch; and notwithstanding the high pressures used, double riveting is still the exception rather than the rule. The consequence of all this is, that in a list, now before us, of 94 boiler explosions which occurred in the United States during 1868, no less than 23 explosions of locomotive boilers are recorded, these explosions thus amounting to over 25 per cent of the whole; while from another record of the explosions which took place in the month of May last, we find, that during that month four locomotives exploded on different American lines. These are facts which demand the serious consideration of American locomotive engineers, and we trust that in the records of future years we may find evidence that the lessons which they teach have not been disregarded.

A remarkable statement has been made by Mr. Higson, the inspector appointed by the British Government, during the course of the inquiry into the Haydock calamity. He said that he "believed that half the explosions in Lancashire had taken place through the mere getting drunk of the miners over night."

OBSERVATIONS OF THE ECLIPSE AS SEEN AT WESTPORT, KY.

[Reported for the Scientific American by G. H. KNIGHT.]

On the afternoon of August 7th, 1869, the writer formed one of a group of observers posted upon a bluff about three hundred feet high near the town of Westport, Ky., commanding, toward the north and west, several miles of the Ohio river and a wide expanse of Indiana lowlands.

Telescopes of various grades, from the 120 diameter down to opera glasses, were in active requisition. All were gazing in silence, and the steel hand of the chronometer had reached 4:31 P. M., when one observer—he of the 120 diameter—exclaimed, "She's touched him!" A minute later, a dark notch on the sun's lower right quarter was visible to the naked eye, and, shortly after, the light and then the heat began sensibly to decline.

Now fades the glimmering landscape from the sight,
And all the air a solemn stillness holds.

Finally the crescent of sunlight slowly narrows to an attenuated, broken thread, skirting the left edge of the moon; we are just able to read the hour 5:29 P. M.; and, lo! the sun has *vanished!* and out flash in all their glory the weird and startling wonders of a solar eclipse!

It is impossible, during the few fleeting moments of totality, for the dazed and bewildered beholder to grasp all the marvels of the scene. Venus and Mercury blaze with more than nocturnal splendor. An aurora-like halo radiates from the moon's periphery far into space. The air is clammy with moisture as that of a cavern.

But we have only two precious minutes, and leave our new acquaintances—Mercury, the somber woods, the leaden sky, the inky river—to other observers, and direct our 120-magnifier to the red specks, some six or seven in number, now plainly discernible around the moon's margin.

These appearances, when brought within the field of the telescope, show a surprising individuality, and all, by shape, suggest violent disturbance, whose motions are, however, of course invisible by reason of the immense distance, and can be ascertained, if at all, only by a record of impressions of successive observers stationed along the track of the swiftly-gliding shadow.

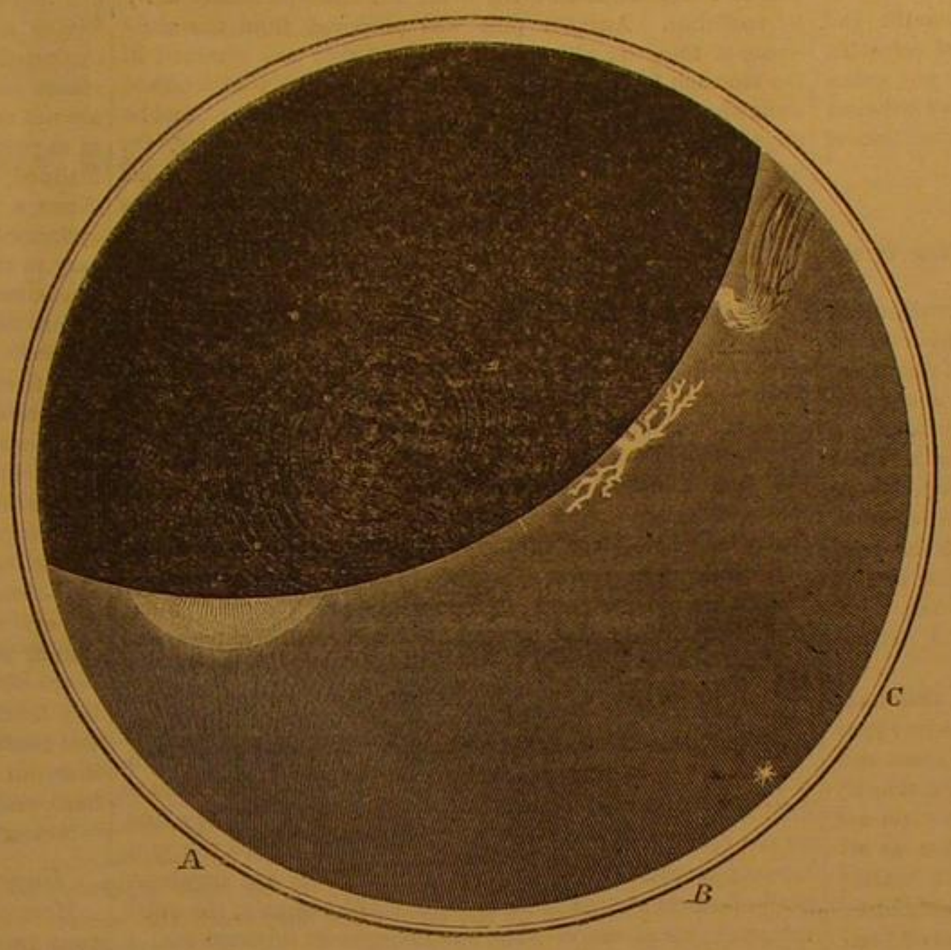
The tube is directed to a point, A, near the moon's nadir (uppermost or inverted in the instrument) occupied by the brightest of these lights. The apparition seems to radiate from some point hidden behind the moon's disk, beyond which it emerges in brilliant silver, copper, and ruby-colored coruscations, the copper tints predominating, and terminates in a circular arc like a half-set sun. The impression conveyed to an observer is of a vast explosion from a center some twenty thousand miles over the edge of the sun's disk, and extending therefrom about fifty thousand miles in every direction.

About fifty degrees of the moon's circumference from the apparition, A, we observe a second and wholly different one, B, which bears a grotesque resemblance to a stag's antlers or to the strands of a raveled rope tossed about by a whirlwind. The shape and corusations of this apparition suggest electrical action (fancy an electric spark 500 miles thick!) or the deflagration of some liquid metal. Its color is crimson; its hight about twenty thousand miles.

Still another and totally different emanation is seen at C, and wears the semblance of a horse's tail, or, more nearly, of a puff of smoke drifting northward, and illuminated by the rosy hues of sunset.

At this stage of observation some one jogged the instrument, and before it could be adjusted to another group, a glint of sunlight from the disk's right margin blinded our unaccustomed retinas and flooded the landscape with returning day. At the same instant, looking upward, we beheld the moon's black shadow, *sharply defined as a wall in the air*, sweep majestically away from right to left before our very eyes—and the total eclipse of 1869 had become a thing of the past!

With our present meager array of facts, hypotheses are premature. On the globe we inhabit, the alternations of days and seasons, tidal and climatic changes, and the other endless metamorphoses of matter—are all referable to solar action; but the sun itself has no sun, and its heat seems too intense for many of the terrestrial phenomena of chemical action. A cause may, however, exist in meteorolites which, falling with inconceivable velocity and possessing a high spheroidal repulsion, may carry with them into the sun's seething chaldron a comparatively cold body of disturbing elements and give rise to the mechanical and other perturbations whose manifestations have been noted.



THE ECLIPSE OF 1869.

Stenographic Reporting by Machinery.

It is said that a stenographic press has been invented in England by the use of which the art of reporting *verbatim* can be acquired in much less time than by the old methods. The reporter sits at something like the keyboard of a pianoforte, and by applying his fingers to the keys, prints the words as they drop from the lips of the speaker, syllable by syllable, on a strip of paper which rolls along underneath. When we say this, we do not, of course, mean that the words are printed in letters. The keyboard appears to be divided into three parts of eight keys each. The left side, worked by the four fingers of the left hand, prints signs which represent initial consonants; the right, worked by the fingers of the right hand, prints final consonants; and the middle, acted on by the two thumbs, prints the medium vowels. We gather that something like a phonetic system of signs is employed. A few months' practice is said to enable any operator to follow the most fluent speaker with ease. We ought to say that M. Gensoul's system renders it unnecessary to transcribe the copy. Just as with the phonetic system, if legibly written, the compositor can set up the speech in common type, from the printed strip furnished by the machine. As to the comparative ease of writing characters with a pen and printing them in the way here described, we can give no opinion.

Of this machine an English exchange humorously says:

"What we should certainly miss, if the machine came into use in the galleries of our Houses of Parliament, would be the happy skill with which the reporters condense the speeches from their notes. We have very few speakers who could bear to be reported by a machine."

So far as the description gives us any idea of the construction of this machine it does not materially differ from one constructed and invented nearly eighteen years ago by Mr. Fairbanks, then in the employ of this office.

DURATION OF THE ENGLISH COAL FIELDS---THE INTERNAL TEMPERATURE OF THE EARTH.

The inaugural address of Sir William Armstrong, President of "The Institution of Mechanical Engineers," at its annual congress which assembled at Newcastle-on-Tyne, England, on the 3d August, made some encouraging statements in regard to the duration of the English coal fields, a subject that has latterly attracted much attention.

He remarked "that coal had a special interest for them in a locality celebrated, since the earliest days of coal mining, for the production of that invaluable mineral. England, with her innumerable steam engines and manufactories, is more dependent upon coal for the maintenance of her prosperity than any other nation, and the question of the duration of her coal fields now very properly occupies the attention of a Royal Commission. The investigations of the Commission are not yet completed, but so far as they have gone the results are reassuring. He concurred in the probable accuracy of the announcement lately made by two of his fellow commissioners, that the total quantity of coal in this island will prove to be practically inexhaustible; but until the complicated details of quantities collected by that Commission have been put together, and expressed in totals, it is difficult to judge with certainty or accuracy on the subject. Although the duration of our coal may, geologically speaking, be practically unlimited, we have still to consider the important question—How long will England be supplied with coal as good and as cheap as at present? We have unquestionably made greater inroads into our best and most accessible coal beds than other nations have done into theirs; and if foreign coals should grow better and cheaper, and ours dearer and worse, the balance may turn against us as a manufacturing country long before our coal is exhausted in quantity. It is clear that our stock of good coal is very large, but most of it lies at great depths, and one of the most important questions the Royal Commission has to investigate is the depth at which coal can be worked with commercial advantage.

"The chief obstacle" the President continued, "to reaching extreme depth is the increase in temperature which is met as we descend. He was justified by ascertained facts in saying that this rate of increase will, as a rule, prove to be not less than 1° Fah. for every 20 yards in depth, and there is reason to expect that it will be even more rapid at greater depths than have yet been attained. The constant temperature of the earth in this climate, at a depth of 50 feet, is 50°, and the rate of increase as we descend is to be calculated from this starting point. Adopting these figures, it would be found that the temperature of the earth will be equal to blood heat at a depth of about 980 yards, and, at a further depth of 500 yards mineral substances would be too hot for the naked skin to touch with impunity. It is extremely difficult to form an opinion as to the maximum temperature in which human labor is practicable in the damp atmosphere of a mine, and it is almost equally difficult to determine how much the temperature of the air in the distant parts of an extremely deep mine can be reduced below that of the strata with which it is brought in contact. It is certain, however, that the limit of practicable depth will chiefly depend upon the mechanical means which can be provided for relieving the miners of the severest part of their labor, for maintaining a supply of sufficiently cool air at the working faces of the coal, and for superseding the use of horses, which suffer even more than men from highly-heated air.

"For the relief of labor we must look to coal-cutting machines for improvement of ventilation to exhausting fans, and for the superseding of horses to hauling-engines driven by transmitted power. The employment of coal-cutting machines, worked by compressed air, conveyed into the mine by pipes, is already an accomplished fact; and when the difficulties and the objections which usually adhere, for a considerable time to new mechanical arrangements, are removed from these machines, they will probably attain extensive application. One of the earliest attempts at coal-cutting by machinery was described by the late Mr. Nicholas Wood, at the former Newcastle meeting of this Institution, and all the really practical results as yet obtained date from that period. The cooling influence of the expanding air as it escapes from these machines, will be a collateral advantage of considerable importance in the hot atmosphere of a deep mine. The air discharged from the pneumatic coal-cutting machines now in use in the Hetton Colliery, escapes into the mine at a temperature of 7° below freezing, and the cold air from each machine appears to be sufficient in quantity to lower the temperature of the circulating atmosphere by 1°. If, as seems to be probable, six or seven of these machines can be employed at each working face, we may by this means lessen the heat by a corresponding number of degrees, and thus afford very considerable relief. The employment of compressed air as a motive power, in substitution of horse traction, is also quite feasible, and may be expected to become quite general in very deep workings.

As regards ventilation, the fan machines of the several constructions tried have already exhibited great superiority over the old method of ventilating by an upcast furnace shaft; and although the efficiency of the furnace system of ventilation is increased by depth, there is reason to believe that the fan will maintain its superiority to greater depths than are likely to be reached in mining."

Facts Elicited During the Recent Debate in England Relating to Patents.

The recent attempt to subvert the patent system in England and the discussion which followed, have elicited some interesting and instructive facts. For instance, it was shown that for centuries flour was ground under unpleasant conditions. The miller in the time of Chaucer had to work amid a cloud of flour which obscured the air, filled his nostrils, irritated his lungs, and lessened his profits. The millers of this generation had the same difficulty to contend against and the same lament to make, until their chief grievance was removed by an inventor. Countless attempts have been made to remedy the evil. These failed either because the flour was drawn away too rapidly, and the waste increased, or because the draft was insufficient, and the nuisance became worse than before. At last, the golden mean was achieved by Mr. Bovill. He succeeded in adjusting the several parts of the millstones so as to multiply their efficiency, yet prevent any flour from filling the air. For this he obtained a patent. Instead of being grateful to the inventor and ready to pay a royalty to the patentee, the millers of England combined together to procure the patentee's ruin by subverting his legal title to the fruit of his brains. What they want is free trade in this invention. Sir Roundell Palmer declares them justified in protesting against the act of him whose ingenuity has conferred a benefit on their trade. The plea is that in process of time each miller could have made the discovery for himself. The supposition is that if there is a demand for an invention the supply is as certain as is the supply of loaves when corn is abundant.

The difference between the two cases is a difference in substance as well as degree. Necessity may be the mother of invention in common speech, but without being so in actual experience. The most pressing demand for a particular improvement has no other effect than that of calling forth a host of suggestions, of which three fourths are foolish and the other fourth is inadequate. All the millers in England had failed to make the change which Mr. Bovill made in their mills. Those who are constantly engaged in a pursuit have little time to consider how best to improve upon their system of procedure. Nor are they disposed to admit that improvement is possible, even while convinced that improvement is desirable. They cannot take an outside and impartial

view of their position. The required change is generally made from without. There were engineers before the time of Watt, but none of them thought of making the improvements which he effected in the steam engine, and some of them did their best to denounce those improvements as visionary.

Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

Phosphatic Bread.

Messrs. Editors:—In your issue of August 21, page 119, your correspondent, B. H. J., is perplexed with the disagreement of the "doctors" respecting Horsford's phosphatic bread.

As regards the simple disagreement it need not surprise us, for as long as people have different modes of thought we shall always find them giving us diversified and conflicting theories in relation to matters which are but imperfectly understood. The subject of Prof. Horsford's bread is one of very general interest, involving, as it does, the health and happiness of all who use it, and is well worthy of scientific and physiological examination. The writer does not grasp his pen with the idea of deciding the controversy between the doctors, but he may be allowed to add the other line of the couplet—

When doctors disagree,
Disciples then are free.

And each person must decide for himself according to the teachings of common sense.

There is one point in connection with bread making on which the doctors do agree—namely, that wheat flour in its natural state, unbolted, contains all the elements of nutrition, and when made into bread is a perfect food. But some people think that bread must be white, therefore they take out the most important parts—the nitrates and phosphates, or muscle-making and brain-feeding elements. The object to be gained by the use of Prof. Horsford's preparation is to restore to the flour the phosphatic elements sifted out with the bran and still leave the bread white. Now the question is, Can this chemical preparation be perfectly similar to the phosphatic elements as they exist in the grain in its natural state?

We believe the doctrine of Dr. Bellows, who maintains that they are not assimilated by the living organs or appropriated as food, but are rejected as poison. We must consider that the laws relating to life are but very imperfectly understood; also, that chemical law and vital law do not always sustain such mutual relation to each other as we might suppose. No one believes that nitric acid is a healthy article of food or that it might be used as a substitute for beefsteak, yet it is known that nitrogen is the basis of both. In the beefsteak it is organized, while in the nitric acid it is not, and this makes the difference between healthy food and actual poison. If it were possible for us to chemically manipulate soils and fertilizers in such a manner as to obtain nutritious extracts suited to stomachs and capable of building up the organs of human beings we never need be in dread of famine. It may be set down as a principle of animal life that it can never assimilate or vitalize inorganic matter. If we must use white bread let us use it without drugs and supply lost elements by using along with it other articles of food containing them in sufficient quantity to compensate for the loss.

J. R. Parks.

Muscatine, Iowa.

[Where does our correspondent get his authority for the statement that inorganic matter cannot in any instance be assimilated by the animal organism? How about the salt used in food? How about the iron administered in medical practice to those whose blood is deficient in iron, the result of which is directly apparent in the hightened color of the lips and cheeks, and also in the examination of the blood itself? It does not answer to propound general laws that conflict with such ordinary facts as these.—Eds.

Nicotine in Lockjaw.

Messrs. Editors:—In answer to the correspondence in the current volume of the Scientific American, No. 9, page 134, it may be allowable to state that the treatment of lockjaw, or tetanus, by tobacco is by no means new. Dr. Wood, in his "Practice of Medicine," vol. II, page 833, says: "Many cures, said to have been effected by this powerful sedative (tobacco), are on record; and it is perhaps among the most efficacious remedies in tetanus."

There are two forms of this disease; idiopathic tetanus, or that which arises spontaneously in the system, and traumatic tetanus, or that which results from wound or injury, both equally characterized by a progressive and permanent rigid contraction as well of the muscles of the legs and trunk as of the jaw. The former may arise from the action of cold upon the body, and is generally curable; the latter is exceedingly fatal. Tobacco, or its extract, nicotine, has also been used in poisoning by strychnia, the effects of which in poisonous doses may be considered as a variety of tetanus.

In 1856, Prof. Haughton laid before the Royal Irish Academy the results of experiments tending to show that the physiological action of nicotine and strychnia were counteractive of each other; and in 1858, Dr. O'Reilly, of St. Louis, Mo., related the successful treatment of strychnia poisoning by the administration of an infusion of the dry leaves of tobacco.

In the *Medical Times and Gazette* for October 25, 1862, will be found an account of two cases published by Prof. Haughton himself. In one, a case of tetanus, caused by a severe burn, "the man was evidently dying when the nicotine was given. It produced an immediate relaxation of the tetanic spasm of the muscles of expression, of respiration, and deglutition, relief from an agonizing pain, and a lowering of the pulse from 130 to 88 per minute. The nicotine was given in one-drop doses." The other case "was one of idiopathic, subacute tetanus, produced by exposure to cold. In this instance the patient recovered, after having taken, during eleven days, 44 drops, or 26·4 grains of nicotine."

In regard to the application of tobacco in strychnia poisoning, may be cited the case of a boy who had taken an estimated quantity of 4 grains of strychnia, as described by Dr. Smyly. "When I arrived he was lying on his back, his head thrown back, chest raised and fixed, limbs rigid, hands clinched, eyelids spasmodically closed. * * * I had an infusion of tobacco made by pouring a pint of boiling water on about an ounce of cut Cavendish. * * * Cold water was added until the liquid was tepid. I made him drink two thirds of this. Violent vomiting followed. He lay quietly on his back for about five minutes, when he was seized with a violent spasm. * * * I gave him another pint of the infusion in three doses, all followed immediately by vomiting. Another pint was prepared from the same ounce of tobacco; about a teacupful of this was retained in the stomach for about five minutes; a second was retained somewhat longer. Profuse sweating now commenced, and he slept for a short time. I left him for about half an hour. On my return I found him lying quietly on his back, all his muscles, except those of his legs, relaxed; breathing less rapid; pulse slower, etc. I turned him on his side, which he was afraid to do himself. He drew up his knees, put his hands under his head, and went to sleep." The boy made a rapid recovery.

G. W.

Baltimore, Md.

Broom Corn in the South.

Messrs. Editors:—Broom corn has become a crop in the South. The great trouble is to get machinery to clean the seed from the brush after it has been cut. I will be obliged if any of your correspondents will write me giving information where I can purchase such a machine.

Broom corn is now worth three hundred dollars per tun, and an acre of ground will produce from half a tun to a tun—the former is a fair average. A hand with a plow and team of mules or horses can cultivate forty acres, though more help will be required to cut, haul, save, and prepare for market.

Cannot some of your contributors to the Scientific American give an essay on the manner of cultivation—whether to drill or step drop—the number of stocks to be left; in fine, all the necessary information, from the planting till the crop is ready for market? It will be of great value and assistance to the farmers of this country, where, till recently, the cultivation of cotton was all that was thought of or cared for.

Benj. Roach.

Natchez, Miss.

Small Steam Power Wanted.

Messrs. Editors:—I was delighted to observe in No. 4, current volume of your journal, a partial description, by Mr. Charles Boynton, of a small steam engine for household use. The great need of such a power is sufficiently manifest, and the mechanic who will furnish a good one may be assured of substantial reward.

It appears to me that, to attain success, three conditions are of indispensable necessity: First, absolute safety; second, simplicity of construction and management; and third, the utmost lightness consistent with the required power. Absence of noise in running would also be a valuable quality.

I cannot agree with your correspondent that a half-horse power engine "will fill the bill." Less power would suffice for some; others will require that of at least two horses. In the smaller sizes a furnace may be dispensed with, and its office fulfilled by a set of lamps. Boilers of steel would be preferable to those of iron. Compared to these advantages, price would be a matter of secondary consideration; yet a low scale of prices would ensure large sales.

The uses to which a low power could be applied with advantage are almost innumerable; but if we consider only the running of the washing and sewing machines—the latter of which are now rapidly killing the women of our land—the demand for it should be enormous. Many will await with impatience the announcement that such an engine is in the market; and, when the Scientific American shall have passed favorable judgment, its success will be certain.

Troy, N. Y. P. J. McCort.

An Old Portable Railway.

Messrs Editors:—In your issue of July 31, is a notice and a view of "Petelers' Portable Railroad." About 1827, I was then about fifteen years old and resided at the foot of Morris street, then called Beaver lane. West street was not complete and did not extend below Cedar street. The Battery had just then been enlarged from about Greenwich street. At the foot of Beaver lane there had been about two acres reclaimed, upon which was a coal yard; Lehigh coal was just then coming into domestic use, and this yard received large quantities of coal, brought there by schooners from the Schuylkill, which was placed in piles or heaps ten or twelve feet high. In order to get it in the remote parts of the yard wheelbarrows were used at first, but that was slow work. There was at that time in the employ of the coal company a young man whose name I have forgotten, who got up a system of railways somewhat similar to "Petelers'." The coal was hoisted from the vessels by a crane in tubs holding six bushels each, which tubs were set upon a small rail car, swinging upon round cars and easily dumped. The cars ran upon sections about twelve feet in length, made of stout scantling with three cross-ties mortised in them, one at each end and one in the center; upon the sections stout strap iron was fastened; the ends of the sections were fastened together by an iron clasp hooking over staples and keyed; the railways were then ready for use. The railway was placed at any hight desired by placing beneath it frames or horses made for the purpose, and the cars with their loads ran to any part of the yard desired. The whole arrangement was taken up and laid down or altered easily and with very little labor. It must be remembered the use of railroads was but imperfectly known in the United States at that time, and all these things made a lasting impression on my young mind. This system is a very good one for all local uses.

Chattanooga, Tenn. E. Newby.

Crumbling of Pistons.

Messrs. Editors:—Several instances of the deterioration of the material in steam cylinders mentioned by your correspondent, George S. Pierce, in your issue of the 28th Aug., have fallen under my observation. In one of these a cylinder bottom was burst out, and the fragments were found so friable as easily to be crumbled between the fingers. The explanation you give is undoubtedly the true one, and the reason such accidents do not oftener occur is because engines are not usually worked with so high a temperature of steam as to produce the result. The case mentioned occurred in an inclined engine on board a small steamer called the *Sue Eaves*, a tobacco boat on the Green River, Kentucky. The cylinder being too small for the power required, it was necessary to carry very high steam. So far as my observation extends, such accidents occur only where high steam is used, or where the steam is superheated. Where the steam is used expansively there is always more or less water in the cylinder from condensation (except in jacketed cylinders), and this water seems to retard, if it does not wholly prevent the deterioration of the iron. Crude oils should never be used in steam cylinders. Pure tallow is a better lubricant, and requires much more heat to decompose it. In cases where it is necessary to use very high steam it were best, perhaps, not to use liquid lubricators at all. Pulverized black lead and soap-stone have been used to advantage, and cannot produce the evil spoken of. Black lead is carbon, but it is not liquid, cannot penetrate, and has no action on the iron. According to the old chemical maxim *Corpora non agunt nisi soluta*. Dry lubricants should be reduced to exceedingly fine powder and contain no grit. Their use induces considerable wear at first, but the wearing parts soon become covered with a very hard, smooth scale, after which there is no appreciable wear.

Newark, N. J. R. D.

Improved Wooden Horse Collars Called For.

Messrs. Editors:—I occasionally get at the columns of your paper and am always interested in them. Passing a few days here, I read your number for the last of July and Aug. As a planter, I am always pleased with anything pertaining to farm improvements.

Of such is Mr. Meyers' horse collar, a picture of which is in the 31st of July No., and it may be a good thing—it looks promising.

I want to tell you how we plowed thirty years ago in old North Carolina. We used home-made wooden hames or wooden collars, and they never hurt a mule or horse. If some of your inventing friends would improve a purely wooden collar, it would be a great help to planters. My neighbors, in Texas, have made crops for some years with wooden collars, and no collar can beat them, only they are not handsome, and are a little too heavy. But they need some improvement to be generally used. They could be made very cheap. Will you call the attention of inventors to these views? They may be fruitful of some good.

Thos. S. Wilson.

New Orleans, La.

The First Circular Saw.

Messrs. Editors:—I send you the remains of a round saw which I made in the year 1813 or 1814, when not over 13 years of age. It has been lost many years, but last spring was found while working my garden.

I send it to you, not for its intrinsic value, but for its antiquity, claiming that it is the first circular saw ever made or used in America. My father, the year this was made, inquired of all the hardware merchants in Albany and Troy for such a saw, but no one there had ever seen or heard of such an article.

This was made of sheet iron, attached to a wooden shaft, used for splitting ¼-in. bass-wood boards for old-fashioned wheel rims, made 2000 revolutions per minute, and, we all thought, performed most admirably. My father, immediately copying mine, made one from the wide part of a broken hand-saw, which, although almost worn out, is still in good working order. Now, if you think my claim, as the young inventor of the circular saw, is unjust, please correct it from any authentic records in your possession of an earlier date.

Lemuel Read.

North Brookfield, N. Y.

[Messrs. Hoe & Co., of this city, have been engaged in the manufacture of circular saws for 40 years, but, so far as we are aware, our friend Read is at the top of the heap in antiquity.—Eds.

Smooth Cutting Edges for Reaping Machines a Fallacy.

Messrs. Editors:—I was very much surprised to notice one of your correspondents, in Nos. 5 and 8, current volume, advocating smooth cutting edges in reaping machines. Now, I have had fifteen years' experience in using reaping machines, and I have never yet seen a dull serrated sickle section that became so by cutting grain alone.

I have a machine, now, that has been in use six years, and has cut from 60 to 80 acres of grain a year, and yet the sickle sections are as sharp as ever, except those that have come in contact with stones and other hard substances. I believe that the smooth edges would cut just as well, so long as they remained sharp, but they would, and do, get dull so easy that the difficulty of keeping them in repair is the reason they are not used for cutting grain.

Your correspondent ought to know, that serrated sickle sections are made as hard as it is possible to make steel, and if they come in contact with nothing but straw, they will last a lifetime, whereas the smooth-edged cutters must be made softer, so that they can be ground when they become dull.

I think it is unfair to call the makers of reaper knives idiots and lunatics, when, really there is so little fault to be found with them. There is more room for faultfinding in the way the other parts of the machines are made. For instance, the use of cast iron where wrought should be used, and wrought iron where steel should be used. In fact, reapers should be as light as possible, and yet be strong. I have seen reaping machines that looked almost strong enough for a saw mill, and yet come to grief very soon. They were so heavy that their own weight broke them to pieces in drawing them over the ground. H. MARTINSON.

Hawksville, Ontario.

DYEING SILKS---PREPARATION OF THE RAW SILK PREVIOUS TO DYEING.

WRITTEN FOR THE SCIENTIFIC AMERICAN BY DR. M. REIMANN, OF BERLIN.

Supposing it is required to dye 100 lbs. of raw silk, 12 lbs. of soap are boiled with a sufficient quantity of river or rain water until all the soap is dissolved; the water is then allowed to cool a little and the silk is introduced; it is allowed to remain in the solution of soap 1½ hours, the liquid in the meantime being kept at the boiling temperature. The silk is then wrung dry, put into linen bags, and once more introduced into a solution of 12 lbs. of soap. It is once more boiled for 1½ hours, and finally washed in the river.

PREPARATION OF SECOND-HAND SILK STUFFS.—The silk is cleaned in a warm solution of carbonate of soda, then boiled for an hour and a half in a soap bath, and washed in the river. It is next placed in water acidulated with a little sulphuric acid, and suffered to remain in it until the original color has wholly disappeared. It is then washed finally in the river.

TO DYE SILK BLUE.—The silk is immersed for some time in a solution of alum, which serves as the mordant. Meantime a solution of indigo carmine in boiling water is mixed with warm water in a suitable vessel. In order to dye 10 lbs. of silk ¾ lb. of indigo is requisite. The silk is immersed in this bath until the requisite shade is obtained. It is then wrung out and allowed to dry in the shade.

In order to give a deeper tint to the material, the silk is passed through an indigo vat. In this way the deepest tints may be obtained.

TO DYE SILK GREENISH BLUE.—In order to dye 10 lbs. of silk, 1 lb. of alum is dissolved in a sufficient quantity of water to completely cover the silk; ½ oz. of sulphuric acid is then added, and the silk is allowed to remain 4 hours in the bath. It is then taken out and wrung dry. A solution of ½ or ¾ lb. of indigo carmine in warm water is then added to the alum bath, well mixed by stirring, and the silk once more introduced. It is suffered to remain in the dyeing bath until a sufficiently dark shade has been obtained. It is then taken out, wrung out, dried, and completed. In order to obtain a uniform color the indigo is gradually introduced into the bath.

A REDDISH-BLUE DYE.—In order to dye 10 lbs. of silk ¼ lb. of protochloride of tin is dissolved in water, and to this solution are added 2 lbs. of solution of nitrate of iron and 1 oz. of sulphuric acid. The mixture is allowed to stand a day and the clear portion of the liquid is then poured into a sufficient quantity of water. The silk is submitted to the action of the mordant thus obtained for half an hour. It is then wrung out, washed in river water, and finally dyed in a bath containing ¾ lb. of yellow prussiate of potash and ¼ lb. of sulphuric acid.

The dyeing operation should continue a quarter of an hour. The silk is wrung out, introduced once more into the mordant bath, then dyed as before, and so on until the shade obtained is dark enough. When this is the case the silk is washed, dried, and finished.

YELLOW DYE BY MEANS OF WELD.—In order to dye 10 lbs. of silk, 3 or 4 lbs. of weld are boiled in water for 20 minutes; the decoction is then filtered through linen and suffered to cool a little. The silk is then boiled as before with one fifth of its weight of soap, then allowed to remain some time in an alum bath, and finally introduced into the above-mentioned weld decoction. Here it is worked about until it is uniformly dyed. A little carbonate of potash may be added to the weld bath in order to vary the shade a little. The yellow tint obtained from weld is sufficiently deep.

YELLOW DYE BY MEANS OF QUERCITRON.—In order to dye 10 lbs. of silk 5 lbs. of quercitron bark are boiled with a sufficient quantity of water; the clear decoction is then poured off, and the silk previously mordanted by alum is immersed in it for half an hour and then washed. By varying the amount of quercitron and adding crystals of soda, various shades of yellow may be obtained.

It is a good plan to add some gelatine to the decoction of quercitron before making use of it, as in this way the tannic acid contained in the quercitron bark may be removed from the liquid.

BRIMSTONE COLOR BY MEANS OF PICRIC ACID.—Picric acid is very often employed at the present day to give a light yellow tint to silk. With regard to the nature of picric acid, it is one of the products obtained from coal tar.

Among the products obtained by the distillation of coal tar at a temperature varying from 150° to 190° Centigrade, is an oil which contains a considerable quantity of carbolic acid.

The benzole being the hydride of phenyl $\underbrace{C_{12}\ H_5}_{\text{phenyl}}\ H$,

the carbolic acid is the alcohol $\underbrace{C_{12}\ H_5}_{\text{phenyl}}\ O + HO$, but is indued with acid properties.

On treating the oil containing carbolic or phenic acid with solution of soda, decanting the clear solution of phenylate of soda and adding sulphuric acid to it, an oil is obtained which when distilled and dried, furnishes crystals of pure phenic acid. This substance, when heated with nitric acid, readily furnishes products in which hydrogen is replaced by the complex atom NO_4, or subnitric acid.

On heating phenic acid with three equivalents of nitric acid, a product is obtained in which three equivalents of NO_4 have taken the place of three equivalents of H, thus

$$C^{12}\ H^5\ O + HO + 3NO^5 = C^{12}\ H^2\ O + HO + 3HO\ (NO^4)^3$$

The whole mass has the appearance of a yellow crystalline paste, which, on being dissolved in boiling water and recrystallized, furnishes yellow crystals to which chemists have applied the name "trinitrophenic acid." In commerce it is called "picric acid," "Welter's bitter," and "picronitric acid."

In a state of purity it is a yellow crystalline substance, having a very bitter taste, and soluble in cold water, which has a brimstone yellow tint when holding this substance in solution. All animal substances when dipped in this solution of picric acid are dyed yellow. Therefore, the the silk has only to be introduced into a solution of the acid containing for every 10 lbs. of silk to be dyed 2 ozs. of picric acid, when a fine brimstone shade will be readily obtained.

The color easily resists the action of sunlight and of air but readily disappears on washing with soap or even with clean water. Therefore the silk must never be washed after dyeing, but merely dyed in the solution and then finished.

The yellow color produced by picric acid may be easily discovered by applying the tongue to the dyed article. The exceedingly bitter taste is a satisfactory proof that picric acid is deposited on the fibers.

YELLOW DYE PRODUCED BY ANNOTTO.—In order to dye 10 lbs. of silk, ½ lb. of annotto is boiled for half an hour with a solution of ½ lb. of carbonate of potash and a sufficient quantity of water. The silk is introduced into this bath and well worked about, while the temperature of the bath is kept close upon the boiling point, though never actually boiling. The requisite shade having been obtained, the silk is washed, then heated at 40° or 50° Centigrade with alum, in the solution of which it is allowed to remain a night. In the morning it is again washed and dyed a second time in a bath at a temperature of 30° Centigrade, which contains a decoction of weld and a quantity of the soap used before for the purpose of cleaning the silk. The dyeing operation is effected by passing the silk seven times through the bath.

The above-mentioned weld decoction is prepared by boiling 20 lbs. of weld with 10 gallons of water and ½ lb. of carbonate of potash. The silk, when sufficiently dyed, is passed through a soap bath containing 3 lbs. of white soap.

AN ORANGE DYE.—In order to impart an orange tint to 10 lbs. of silk, 1 lb. of annotto and 3 lbs. of carbonate of soda are boiled with water. The solution thus obtained is filtered and the silk worked about in it for half an hour. It is then wrung out, washed in the river, dried, and finished.

A BLACK DYE.—This most important color is obtained as follows;

1. BLUEISH-BLACK.—To dye 10 lbs. of silk blueish-black 2 lbs. of alum are dissolved in 20 lbs. of boiling water. This solution is then added to a sufficient quantity of cold water. The silk is then introduced, worked about some time, and allowed three hours in the solution. Meantime ¾ lb. of sulphate of iron is dissolved in water, and the solution added to a bath of warm water, and the silk, removed from the alum bath, is introduced into it. It is worked about here for a quarter of an hour and then washed.

The dyeing bath is prepared as follows:

Five pounds of logwood in powder or small chips are placed in a bag and boiled in water until all the coloring matter is extracted. The bag with the wood is then removed from the water, and a decoction added consisting of ¾ lb. of barrel soap in water. Having added the needful quantity of water, and varied the temperature of the bath so that the hand can be put into it without injury, the silk is introduced and worked about in it for twenty minutes. It is then washed and finished. If the color is still not dark enough the silk must be immersed in a fresh logwood bath.

Demand for Immigrants in the South.

The following extracts are from the work on "Cotton culture and the South," noticed under the head of "New Publications:"

"No possible growth in the labor now there can answer the cry which comes from all sides for 'more capital, more labor; money to build up towns, to establish factories and railroads; money to buy more and better stock and tools; men with brains and energy, and muscle to work them.'

"Expressions like the following repeat themselves in almost every letter we receive, and from every portion of the country:

"'Black laborers seem to be passing away; we need capital, capital, capital, and reliable labor; I must acknowledge the blacks are greatly improving in their habits of industry, if we could keep mean northern people away from them, who intoxicate them with fabulous tales.'

"'Immigrants are wanted by all, and from every quarter; mechanics, artisans, and workers of all trades,—men to till the soil.'

"'Honest, industrious, and intelligent laborers are needed, and good fertilizers, good and improved tools and capital; until we are supplied with intelligent labor, we can make but little improvement in farming. Negroes know very little about the use of machinery, and are too careless to be entrusted with it. We have no caterpillars or army worms here in Tennessee.'

"'We need everything but land and climate,—capital, management, and ambition, muscle—in other words a plenty of the article, "live men." The soil and climate call loudly for workers.'

CHINESE LABOR.

"With regard to Chinese labor, time and actual trial alone can prove whether it be practicable and economical. The dangers of the coolie system are its turning into a system of permanent peonage or slavery—systems which the old world is discarding, not entirely from motives of right, but also from conviction that they are the worst economy, adverse to both the social and material progress of the communities in which they exist. If men are to be treated as mere tools, perhaps slavery, through the selfish interest of the owner, secured the better care for that health and comfort which went so far to make good the working trim of his slaves; but the voice of the people has been decisive on this subject in the late war, and no system, we believe, can ever be permanently inaugurated in this nation except under laws securing to all laborers the privileges of freedom. If ever coolies are introduced we may be sure there will be the strictest legislation relative to contracts,—legislation resembling perhaps the English, but in no respect permitting the abuses existing under the Spanish or French laws.

"As citizens we may, however, question the expediency of flooding the country with a population, which—if we may judge, we trust without harshness, from what we have read and have gathered from conversation with those who have had actual experience with this class of labor—though it would contribute vastly to the labor force, might bring with it many demoralizing vices that could only be a tax upon the moral force of the country.

"But, in treating the cotton question purely as one of economic science, and not in its connection with morals, it must be admitted that so far as their qualifications as laborers are concerned, there is probably no race so well fitted to meet all the requirements of cotton cultivation as the Chinese.

"Cotton requires persistent industry, nimble and dexterous fingers in the picking season, and the crop is made more by saving than by hard labor; all these needs are exactly met by the Chinamen. At the same time he will live in the most satisfactory manner upon rice and other vegetable food, all of which he can raise while cultivating the cotton crop, and he will thrive in the climate of the river bottoms, which, whatever may be claimed for the uplands, cannot be said to be conducive to great vigor on the part of white laborers.

"Such being the facts, when we consider that the fertile cotton fields of Arkansas, Louisiana, and Texas, have never yet been cultivated in cotton to the extent of two acres in each hundred; that these fields have been brought by the Pacific railroad within sixty to eighty days distance of an unlimited supply of labor, and that this distance can be bridged at small expense, it would seem strange indeed if supply and demand did not respond to each other.

"It may be added that the Chinese laborers who have built the Central Pacific railroad, were procured under contract, which did not come within the prohibitions of our coolie law, but they came over under a system of advances well secured by those who promoted their immigration, but which left the laborers to all intents and purposes free.

An Ingenious Invention.

An invention has been produced in Paris for settling disputes between cab hirers and cab drivers, which seems to deserve attention. According to the account of it which we have received from a correspondent, the "compteur mécha-nique," or calculating machine, not only reckons the distance traversed, but indicates as well the exact sum of money due to the driver. Two dials are fixed on the back of the driving seat; one contains a clock, while on the other the distance traveled is indicated by a hand acted on by the wheels; it is entirely beyond the control of either cabby or his "fare." The apparatus is put in and out of gear by the lowering and raising of a lever bearing the word "libre" which is only visible when the cab is empty and the "compteur" consequently unemployed. There is no danger of the driver omitting to lower this lever as soon as he is hired, it being evidently his interest to have the greatest possible distance paid for; while, on the other hand, it would be useless for him to try to make a fictitious fare by driving about with his "compteur" in motion, for a card in the interior of the machine registers the distance traversed during the day, and the money to be accounted for to the cab owner. The great difficulty has hitherto been to find a means of marking the time spent in visits, shopping, blocks in the streets, etc., when the wheels and the tell-tale are necessarily at a standstill. M. Bruet, the inventor of the new register, has now overcome this difficulty by an ingenious contrivance, by means of which, as soon as the wheels cease to act on the indicator, the clock which forms part of the machine, keeps the tell-tale hand moving at a rate which credits the driver with eight kilometers (about five miles) an hour, or two francs, according to the Paris tariff.

THE term freestone has been applied to any stone which can be wrought with the mallet and chisel or saw. In this country it is popularly applied to brown sandstone.

IMPROVEMENT IN BUCKETS.

This invention illustrates the fact that even in articles of common and universal use there yet remains opportunity for improvement. Who would have thought there could yet be a useful modification of the form of the bucket. Improved machines for its manufacture, for cutting staves, heading, etc., might well be expected; but the thing itself was generally supposed as perfect as it was possible to make it.

Nevertheless, here we have a real improvement, the object being to enable two persons to comfortably and easily carry a large bucket when filled with a heavy fluid, when the labor of one is not adequate to the purpose. The invention is simply a combination of handles with the ordinary bail, and

is equally applicable to all sorts of bailed vessels, as pots, kettles, etc., which have hitherto required the use of the bail.

By reference to the engraving it will be seen that when the bail is in use the handles are turned down out of the way, and when the handles are employed the bail is turned down. The device is extremely simple and cannot fail to be useful.

Patented through the Scientific American Patent Agency, June 1, 1869, by John H. Tomlinson, of Chicago, Ill.

Hell Gate Obstructions.

We learn from the Brooklyn *Daily Times* that, as the Shelburne plan of drilling and blasting the rocks at Hell Gate has failed, there are capitalists ready and willing to risk large sums upon the success of the apparatus invented by Mr. Samuel Lewis, illustrated and described on page 385, Vol. XX, of the Scientific American. That paper has no doubt that Mr. Lewis and his supporters will guarantee the removal of the obstructions for half the estimate made by General Newton on the tunneling project, which, it asserts, is a pet scheme of General Newton's.

If these statements are correct, it would seem only reasonable that the invention of Mr. Lewis should be tried, and, if found to answer the expectations formed in regard to it, allowed to proceed with the work.

The *Times* charges that General Newton is so in love with his own project that he is incapable of forming an impartial judgment on the merits of Mr. Lewis' plan. We are sorry that this should have been said, or even thought, as we believe it is unjust to General Newton, and may be injurious to the interests of Mr. Lewis, who, we are confident, does not entertain the opinion expressed by the *Times*. We trust that for the satisfaction of all parties, a trial of Mr. Lewis' invention will be permitted.

Application of Leichtenberg's Experiment to the Mineralogical Analysis of Rocks.

M. S. Meunier proposes to make use of the well-known experiment of Leichtenberg's electric figures to separate from each other the divers mineralogical constituents of some kinds of rock. We briefly remind our readers that the experiment alluded to consists in charging with electricity a cake of resin or sealing wax, by means of a previously-charged Leyden jar; it is thus possible to charge certain portions of the cake with positive, others with negative electricity. In order to exhibit this to sight it is usual to blow, by means of a small pair of bellows, on to the cake of the resin, a mixture of very finely powdered red lead and sulphur; the friction, on leaving the nozzle, causes the powders to become electrified, and the sulphur being negatively electric is attracted by the curved figures positively electric on the cake, while the red lead follows the opposite course. M. Meunier has tried thus to separate sulphur-bearing trachite into its mineral constituents, and succeeded perfectly in getting the sulphide and feldspar from each other; he states that he has equally well succeeded with rocks made up of two different silicates.—*Cosmos.*

In England a huge steam hammer, weighing 1,000 tons, is being made for the Russian Government. The hammer head weighs 42 tons, the anvil block 560 tons, and it is to be used in forging steel guns.

FIRE AND RAT-PROOF BUILDINGS.

Our readers will be prepared, by several articles which have lately appeared in the SCIENTIFIC AMERICAN, upon the subject of fire-proof and rat-proof buildings, to examine critically the device herewith illustrated.

The inventor has spent three years in experiment and study to perfect this system, and, while primarily aiming only to perfect a system of fire-proof building, now claims that he has secured several important results not at first contemplated. One of these coincident results is the rendering of a building rat-proof as well as fire-proof. A second is, that a very superior wall to that formed by plastering on wooden lath is obtained; the cement or plaster not drying out rapidly, but retaining its moisture until a perfect chemical combination has taken place between the materials of which it is composed. The plaster is found, after it has hardened, to be four times as hard as common plastering. The peculiar form of the iron laths also prevents the falling down of any portion of the plaster from any ordinary cause, or from the action of great heat. Great pains have been taken to bring the cost of this method down to such a figure that it can successfully compete with the ordinary materials and methods of building. The inventor informs us that this has been so far accomplished, that the cost for fire-proofing a floor—which also answers for deafening it, is not so much as that of wood used for deafening or "pugging."

The features of this invention will be easily understood by the aid of the accompanying engravings. Fig. 1 is a sectional view of the upper and under side of a fire-proof and rat-proof floor with intervening joists and spaces, and also of a vertical wall with sections of lath and concrete.

Fig. 1

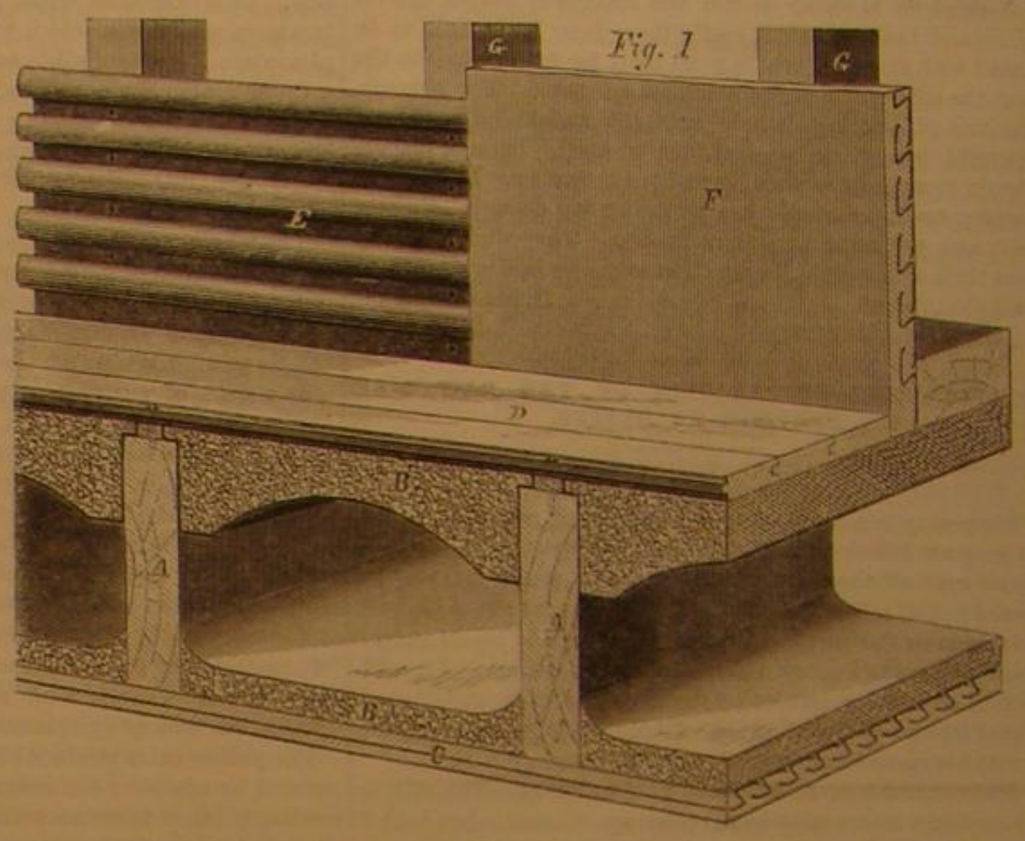
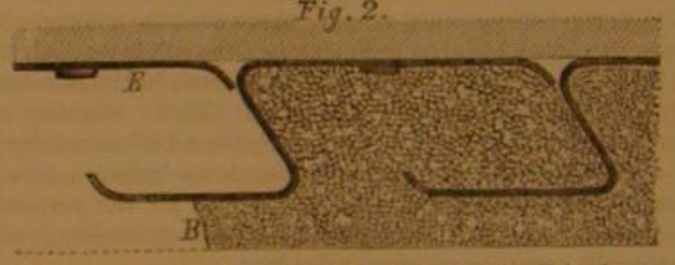
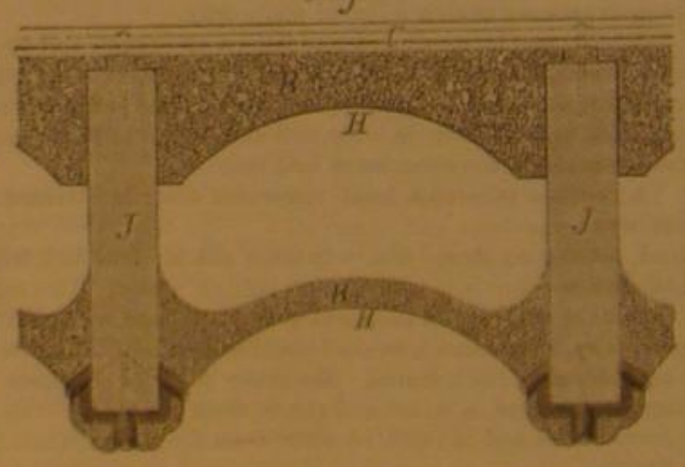


Fig. 2.



In this engraving the joists are lettered A; B is the concrete; C the lath and plaster, or ceiling, on the under side of

Fig. 3.



the floor; D is the floor; E the iron lathing; F the plastering; and G the studs.

Fig. 4.

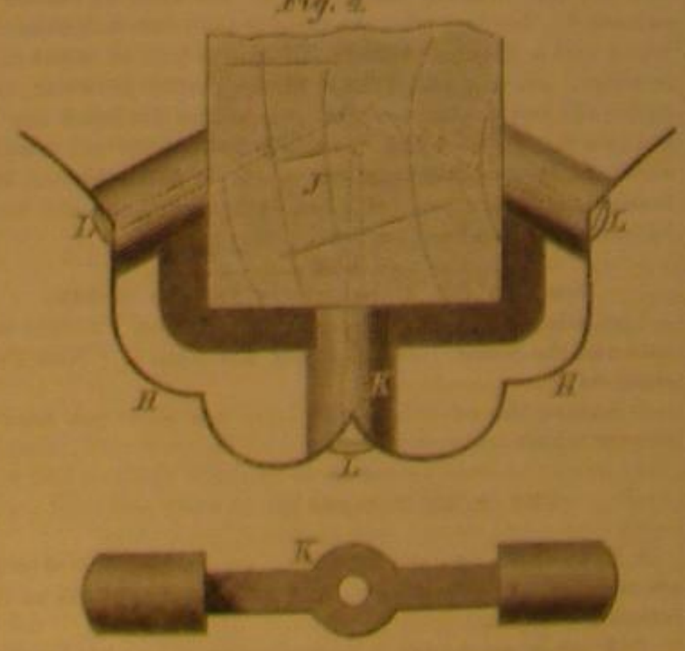


Fig. 2 is a section of the iron laths and the plastering, showing the peculiar form of the laths and the manner in which they support the plastering.

Fig. 3 is a section of flooring and metallic ceiling for manufactories, etc., in which the letters H represent, respectively, a metallic arch with rib moldings, and also a metallic arch to support the concrete underneath the flooring; J the joists, and C the flooring.

The method of putting on the metallic ceiling is shown in Fig. 4, in which H represents the metallic ceiling, J the joists, K the firring-off clamp, L the nails which secure both the metallic arch and clamp.

The whole system will now become perfectly plain to all who have the least knowledge of building, and we think it must be obvious to every candid reader that neither fire can consume, or rats penetrate, a wall of this construction. The basis of these walls is wood, but wood so protected from the external heat, that only a fire of such intensity as to convert the timbers into charcoal, could weaken the main structure. Such an effect could scarcely be produced by the burning of anything but large quantities of the most concentrated fuel inclosed in a building for a long period. The term fire-proof, as applied to buildings, can only be understood to mean proof against the destructive action of fires such as can occur in and around buildings in the course of the ordinary business of life. From what we can judge of this system we think it promises as well, certainly, as any of its rivals; and as the inventor states some ten or twelve first-class buildings are to be erected this season on this plan, its efficacy is evidently believed in by those who are qualified to decide upon its merits.

This improved system of constructing fire-proof building has been made the subject of three patents, viz., January 26th, April 13th, and May 4th, 1869, by Edwin May, of Indianapolis, Ind., who should be addressed for further particulars.

Joint Exposition of the Wool Industry of the United States, at the American Institute, in the City of New York.

The coming exhibition of the American Institute, which will open on the 8th September and close on the 30th October next, bids fair to be the best exposition yet held by this Association.

A feature of great interest is foreshadowed in the following notice published by the Executive Committee of the National Association of Wool Manufacturers: All American manufacturers of goods composed wholly or in part of wool, and of supplies, machinery, and tools, used directly in the wool manufacture, are invited to exhibit samples of their manufactures at the Joint Exposition of the Wool Industry of the United States, to be held under the auspices of the American Institute, in the city of New York, by the National Associations of Wool Manufacturers and Growers. The place of exposition, on the corner of Sixty-third street and Third avenue, will be open for the reception of goods on the 1st of September next, and is now open for the reception of machinery.

Manufacturers who have agents, or commission houses in the city of New York, are advised to forward their goods through such agents or houses, and to devolve all the charge of their goods upon them. Articles forwarded from other places must be directed to "Wool Industry Exposition, care of N. Kingsbury, Superintendent, corner of Third avenue and Sixty-third street, New York." The name and residence of the exhibitor, and list of contents, must be marked on the package, the freight and other charges upon which must be prepaid to the place of exhibition. All goods should be forwarded to the Exposition rooms on the 1st of September, or as soon thereafter as possible.

Persons desirous to exhibit, who have not already given notice of their intention, are requested to give such notice immediately to N. Kingsbury, Superintendent, care of American Institute, New York city, or to John L. Hayes, Secretary, Boston, Mass. The notices of intention to exhibit already received, place it beyond a doubt that this will be the most brilliant exposition of the products of a single industry ever seen in this country. Every manufacturer should take pride in contributing to its success, and doing his part to demonstrate the capacity of the United States for industrial independence. Let every mill send a specimen of its products.

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BUSINESS HINTS.

The last number of *The Engineer*, now before us, contains eighteen pages of advertisements. This leads us to remark that the English are without doubt the most systematic advertising people in the world, as the columns of all their leading journals bear evidence. The *Times*, *Daily Telegraph*, and others of the great London journals enjoy an advertising patronage which would surprise many go-ahead Americans. There is much meaning in the fact, for it is beyond belief that the practice of advertising, day after day, and week after week, would be continued by shrewd business men unless it brought a good return.

We have heard it said that a business man in England expected to spend every year in advertising as much as he paid out in store or shop rent. This is true to some extent in this country—indeed we have hundreds of business men in this city who owe their greatest success to a judicious system of advertising. A. T. Stewart, for example, has always been an extensive advertiser, and old Stephen Girard declared that he not only advertised when business was good, but he also pursued the same system in dull times as the surest way to make things lively.

Local journals are good for local advertising, but if the manufacturer and trader wish to make their wares generally known, they must, of necessity, select for that purpose journals that circulate extensively throughout the whole country. If advertising does not pay, the parties have only themselves to blame, when they select for that purpose journals of small circulation. Messrs. G. P. Rowell & Co., of this city, in their American Newspaper Directory, publish what they they call "The Excelsior List," that purports to give the circulation of many of the leading journals. In the New York city list there are but twelve weekly papers that claim to have 30,000 circulation.

The SCIENTIFIC AMERICAN is put down at 35,000, and ranks as one of the best advertising mediums in the country. Our circulation is understated, as we are now printing 75 reams of paper each week, or equal to 36,000 copies. If advertisers will take character as well as the extent of circulation into consideration they will find that the rates of the SCIENTIFIC AMERICAN are lower than any other journal now published, not to speak of some other papers that have scarcely a recognized existence beyond the office of publication.

HEAT AND WORK.

In an article published on page 105 of the last volume, we endeavored to show that whatever work was performed by the mass motion of a steam engine was a subtraction from that mass motion, the mass motion itself being a subtraction from the heat of the steam. Some correspondents have either failed to recognize the truth of the proposition laid down in the article referred to, or they do not understand it. The following query will illustrate:

"Why will not the exhaust steam from an engine impart to water the same amount of heat it contained when it entered the cylinder, minus that radiated from the cylinder during the stroke?"

This correspondent has been experimenting as follows: He estimates from standard formulæ the amount of heat in the steam entering the cylinder of his engine at each stroke, and the radiation from his cylinder during the stroke, and finds that the number of units of heat imparted to the water used for condensation, falls short of the amount contained in the steam when admittted to the cylinder, far more than can be accounted for by radiation. He is surprised at the result, but has brought himself by this experiment to the threshold of a discovery, none other than the law of the correlation and conservation of force.

The reason for his undertaking the experiment alluded to is instructive. He desired to heat his building with the same fuel required to drive his engine, supposing that as the heat escaping from the boiler and engine helped to warm the air of his factory, he might capture all the rest by passing the exhaust through some combination of pipes or heaters, and thus use the entire heat generated by the combustion of the fuel consumed for heating purposes, making a clear gain of the work performed.

His experiments have convinced him that this can not be done but he fails to see why. The reason is, simply, that the heat which is converted into work can only be used for heating purposes when *reconverted* into heat.

The correlation of forces, that is, their convertibility into each other, and the conservation of force, that is, its indestructibility, are two fundamental principles of physics. If the heat imparted to steam by the combustion of fuel could be wholly converted into work, the steam would be wholly condensed and leave the exhaust in the form of water, its temperature being precisely that at which it was fed to the boiler. But much of the heat escapes by radiation before any work is performed by the steam. This heat still exists as heat, and may be used to warm a building or for any other purpose to which it can be advantageously applied. The steam when it performs work becomes partially condensed in the effort; a portion of it is converted into mass motion or work, and only a residue escapes in the exhaust steam. So far as the mass motion is employed in overcoming friction, it becomes reconverted into heat, but when employed to the raising of weights or to the overcoming of any resistance other than friction, it is not reconverted into heat but into other forces.

If the coal used in the furnace of the engine be such an amount that it would exactly heat the building in which the engine is placed, and the radiated heat and that contained in the exhaust steam be applied directly to heating the building, it will be found that an additional expenditure of coal proportional to the amount of the work performed by the engine, will be needed to secure the proper warmth, not taking into account the escape of heat through the smokepipe or chimney which is always a source of loss.

THE EFFECTS OF NIGHT SOIL ON VEGETATION.

Our attention has been several times called to an article on this subject, which, it is said, has been copied extensively in the country papers and credited to the SCIENTIFIC AMERICAN, deprecating the use of night soil as a fertilizer. We have no recollection that such an article ever appeared in our columns, and do not know upon what grounds the objections were made; and we deem it probable that a mistake has been made in referring the article to this journal, unless, indeed it was one of the numerous communications addressed to us, expressing views for which we do not hold ourselves responsible. The article referred to is said to have been published a long time since, and, after search, we are unable to find anything expressing the views which are attributed to us.

We will say, however, now, as the question has an important bearing upon the earth-closet system, at present attracting much attention, that, in our opinion, a compost made of earth and night soil in the proper proportions, would prove a most valuable and concentrated fertilizer.

This opinion is based, not only upon chemical considerations but upon experience and observation. We have used it on land devoted to flower and vegetable culture with the very best results.

We have seen rose bushes, which have become old and unproductive, stimulated into the most luxuriant bloom by putting crude night soil, dipped from privy vaults, into a trench dug around them, at a little distance from their roots. The experiment has been repeated with peonies with the same results.

All manures, however, used in this way, are apt to prove too heating, especially in a dry season. It is much better that fermentation should take place before these are applied to soils, where delicate plants are to be reared, unless they are used for forcing, when the additional heat is beneficial. We, for this reason, advocate for gardening purposes, the keeping of any compost, until it has well rotted before applying it to a garden; but for grain or grass crops, plowed under in the spring, there could be no objection to its immediate use, and much of the ammonia which would be lost in the process of rotting would be thus saved.

It will thus be seen, that instead of condemning the use of night soil as a fertilizer, we regard it with the highest favor, and we have based our disapproval of the water-closet system principally on the fact that it is a constant and enormous tem principally on the country, through the great waste of this valtax upon uable fertilizer, depositing it in the beds of rivers to infect their waters, instead of restoring it to the land from which its constituents have been derived.

THE STREET CROSSING QUESTION.

In New York and in other large cities where the streets are crowded with vehicles, the crossing of streets by foot passengers is attended with danger and inconvenience. "Good clothes" stand no chance in muddy weather, or more properly speaking, they stand an excellent chance of being spoiled by bespatterings of filth.

But it is one thing to point out a disease and quite another thing to prescribe a remedy. In this case it must be a specific—applicable to every case and a sure cure.

We have tried the elevated bridge in New York and have given it up for the best of reasons. It would not answer. Some have suggested the tunnel as a substitute, but this appears to us to be only inverting the evil. In the first case, it is climb up and then down, in the latter, it is first down, and then up. People with sound legs prefer to take the risk on the surface, and to encounter the fire of mud pellets rather than to execute the climbing, while those with weak legs find themselves unequal to two long flights every time they wish to cross a street, preferring to be taken in charge by some friendly M. P., and piloted to the opposite shore.

What is to be done? Can anybody make a practical suggestion? Don't all speak at once, or quote from Hamlet's soliloquy

—"Rather bear those ills we have
Than fly to others that we know not of."

Is this problem so intricate that its solution is not possible? Is there not among all the list of mechanical contrivances—turn-tables, flying machines, wire tramways, cranes, swings, and what not—something that will take a human body up and set it down safely across a mud river? Make answer, inventive genius. Is a street crossing harder to be accomplished than an ocean cable, or a railroad to the top of Mount Washington?

For ourselves, we are better at recording and writing up others' inventions than making them ourselves, and therefore we are in no hurry to try our hand at inventing a new street crossing; but we shall rejoice if some of our readers can immortalize themselves by giving to the world this long sought for and prayed for desideratum.

We see by the last number of the London *Builder* that steel bridges for the crossings in that city are talked of. We hope they may like them when they get them, but whether made of steel or iron, stone or wood, New York has had enough of the bridges.

The bridges proposed are to span the streets eighteen feet above the carriage way, which at the lowest computation, would make 48 steps up and down, a most agreeable thing to contemplate for weak knees in hot weather, or when the steps are covered with ice. Some have suggested that if these bridges were built the people would not use them. We have had it demonstrated that they would not, and if the Londoners are wise, they will take a leaf from our experience and drop all further consideration of bridge crossings.

Nevertheless, bridges may not cost quite so much in London as did our Fulton street bridge, and the proposed experiment may be less expensive than ours was.

INCIDENTAL OBSERVATIONS.

What inventor, mathematician, or chemist, has not, while pursuing the solution of an intricate problem, been struck with the vast number of facts strewed all along his path like pebbles upon a seashore. Many of them are new and striking, but in the ardor of the main investigation are too often lost sight of and forgotten. They are gateways to diverging avenues, leading off into new and unexplored regions of thought and knowledge.

Would it not be wise to put up some landmarks by which they can be readily referred to when the mind finds itself at liberty to recur to them—some memoranda, in brief, of the facts themselves, and the train of thought suggested by them on first sight?

We would by no means advocate a discursive habit of thought. The only way to succeed in a mental struggle with an intricate problem is to pursue it singly and unremittingly. But there is no reason why we should, in a search for pearls, reject what may prove a diamond, when we have time to scan it.

With inventors we are sure the habit of recording incidental observations and suggestions made in the working out of their devices, would prove of the utmost value. Many a man working for a thing which he was never able to accomplish, has found what has proved more valuable, than what he directly sought ever could have been. But the majority of such incidental discoveries are never thought of a second time; or, if thought of, remembered only in a dim, cloudy manner too indefinite to avail in their recovery.

It has been said of one of the most successful authors, that he was in the habit of carrying in his pocket a memorandum book, wherein he recorded any idea or peculiar form of expression that struck him as weighty or admirable, on the instant it occurred to him, and that he would even rise from his bed in the night to do this rather than to trust his memory to reproduce it on the ensuing morning. The same has been asserted of some musical composers of note, and we know it to be the case with some literary men of the present time, with whom we are acquainted.

We advise, not without having tested its worth, a similar course for inventors and mechanics. Let any one try it for one year, and then carefully examine their notes thus collected, and they will be surprised to find what a mass of interesting and, in many cases, practically useful information a book of fifty or sixty pages, six inches long by three wide, can be made to hold. Sifting out the chaff there will always remain some good seed, which, sown on good ground, will bring forth fruit—some an hundred fold, some sixty fold, some thirty fold.

Every mechanic, particularly he who wishes to become a successful inventor, ought to be a student, not only of recorded facts in books, but of facts as they are brought to his notice daily in his practice. But he may not, on the instant a fact presents itself, always stop his work and go into a brown study over it. He may, however, as he leaves his work at

noon or at night, put down the data for future study and thought, and, if of an inquiring mind, he will find the highest pleasure and profit in such study. We have little confidence in the ultimate success of those mechanics who are willing to grope blindly along, content to acquire merely that modicum of knowldege which will gain for them a full day's wages. Such men will of necessity remain hewers of wood and drawers of water, while for the more intelligent and better informed workman, there is always an avenue for advance in position and earnings.

The following fact will illustrate and enforce the importance of such a course as we advise, better than a column of argument.

From time immemorial the Government of Great Britain has caused a red worsted thread to be always woven into the cordage manufactured at their roperies. The object of this thread is to prevent pilfering, and to facilitate the recovery of stolen property. One fine morning it struck a poor man in Chatham Yard that a jute thread would do just as well as one of worsted. The experiment was tried. The rope with the jute thread in it was tested in a variety of ways—by being exposed to salt water and the weather for a sufficiently long period—and the result was that worsted was abandoned. Such is the magnitude of government transactions that, by simply substituting that little thread of jute for one of worsted, that country saves £1,800 a year forever,or at least as long as ships want rope. Mr. Baxter nearly doubled the pay of the mechanic to whom the credit of this discovery is due.

OCEAN TELEGRAPHY.

The successful laying of the French Atlantic Cable has banished the last doubt as to the practicability of successfully laying and working cables of any desired length. The first attempt at laying a cable across the bed of the Atlantic failed. This failure has been followed by two remarkable successes,and ocean cables are henceforth to be the means by which a large proportion of all the communication will pass to and fro between the hemispheres. So long as only one cable had been laid and worked, there remained the doubt that this success was exceptional, that it might be followed by a series of failures, which would demonstrate a great risk in investing money in such enterprises. But the recovery and putting in order the first cable, for a time almost believed to be a total failure, and the now perfect and profitable working of these cables betweenEurope and America, have doubtless convinced capitalists of the safety of this class of investments, and the raising of funds for further enterprises of this kind will be an easy matter.

It must be apparent to every thinking man that the present cables cannot afford facilities equal to the growing demand. A cable from San Francisco to China is inevitable, and more Atlantic cables must be provided.

With these facts in view we are not surprised to learn that many new projects are talked of. Among these is a cable from Scotland to Quebec by way of the Faroe Islands, and a West India and Panama cable, which is designed to unite South America with Europe by the way of Cuba and the United States and the cables already laid down.

The rapid and astonishing increase of telegraphic communication throughout the world, has only a parallel in railroad extension.

LOCATION OF HEAVEN.

Theological writers have always been puzzled to fix upon any very definite idea in regard to the geographical—so to speak—location of heaven. The Christian faith associates it as a final resting place for redeemed souls, and preachers have drawn from it the lesson that Revelation, for wise reasons, had veiled the subject in obscurity. But science is progressive. It digs deep into the bowels of the earth, and soars away into regions of infinite space, so that at last we have a philosopher sufficiently bold who undertakes to remove our perplexity and solve all our doubts upon this sublime subject.

Instead of being a matter of philosophic and Christian speculation we are now provided with a scientific solution of the whole difficulty by D. Mortimer, M.D.—not D. D. According to his theory "there is a vast globe or world far *within* from the surrounding photosphere of ethereal fire, which all denominate the sun, which globe is estimated to be at least five hundred thousand miles in diameter." Dr. Mortimer states that he has brought divine revelation to bear on this vast central globe, and is plainly convinced "that the globe thus discerned is the Heavenly Empire wherein the righteous from this earth find their future home." Not content to have made the discovery of the exact locality of "our heaven," the doctor has gone into a mathematical calculation of the number of minutes it requires for the spirit's flight from earth to this celestial abode, for all of which information doubting and believing souls will forever thank the learned doctor.

CALCULATIONS ABOUT HUMAN LIFE.

By tables of mortality are understood, carefully-computed lists, indicating how many survivors remain annually, during a series of years, out of a given number of births at the start.

Many such tables have been computed during these latter years by various authorities and in different countries. They are highly interesting in a philosophical point of view, and indispensable for the calculation of the rates of interest to be paid by life insurance companies, the importance of whose operations is becoming daily better understood and appreciated by the intelligent public.

The first tables of mortality were drawn up by Halley in the year 1693, and were based on the registers of the city of Breslau, in Silesia.

In 1746, De Parcieux published his "Law of Mortality in France for Chosen Heads." These chosen heads comprised only monks and nuns who had taken the oath of celibacy.

In 1806, Duvillard computed another for France, from facts collected before the Revolution.

The first table in which a distinction is made between the sexes was, if we are not mistaken, established by Demonferrand in 1838 in the *Journal de l'Ecole Polytechnique.*

In England the first tables used were those calculated by Galloway and by Finlaison. In Germany, Baumann, Casper, and Hülsse were the pioneers in this branch of statistical science, and in Holland it was Kersseboom. In Belgium the eminent Secretary of the Academy of Sciences and Director of the Royal Observatory, Mr. Quetelet, who, during a long life of study, devoted himself specially to the investigations of the laws which regulate human mortality and of the periodicity of natural phenomena in various countries, has at different times published very complete and interesting tables on the present subject.

The rates of mortality in Belgium being very similar to what they are in this country, we reproduce them below, believing that they will prove interesting to many of our readers to whom the original documents are not available. In the first column is indicated the series of years from birth to the end of life; in the second column, how many persons out of 100,000 born, remain alive on the average at the expiration of each succeeding year; in the third column is found the probable further duration of life taken from any given period, as shown in the first column. The last column indicates that one to one may be betted on a person's chances of attaining an age obtained by the addition of his actual age to the number of years he has still the probability of living.

The duration of the life of females in town and country is nearly equal, but with men it is far different, those living in rural districts living much longer than those in the cities. After the age of 25 the life of rural men is rather longer than that of the women.

TABLE OF MORTALITY.

Age.	Survivors.	Probable life.	Age.	Survivors.	Probable life.
Born.	100,000	22·9			
1	79,448	38·4	53	30,944	....
2	71,228	43·5	54	30,333	....
3	67,121	45·9	55	29,720	16·5
4	64,564	46·9	56	29,049	....
5	62,845	47·2	57	28,339	....
6	61,587	47·2	58	27,615	....
7	60,568	47·1	59	26,896	....
8	59,702	46·8	60	26,160	13·1
9	58,944	46·4	61	25,392	....
10	58,220	45·9	62	24,471	....
11	57,684	45·3	63	23,543	....
12	57,150	44·7	64	22,691	....
13	56,616	44·0	65	21,625	10·1
14	56,082	43·4	66	20,630	....
15	55,548	42·8	67	19,634	....
16	54,948	42·2	68	18,601	....
17	54,318	41·6	69	17,578	....
18	53,557	41·1	70	16,529	7·5
19	52,965	40·6	71	15,437	....
20	52,254	40·0	72	14,325	....
21	51,528	39·5	73	13,210	....
22	50,747	39·0	74	12,091	....
23	49,948	38·4	75	10,976	5·6
24	49,150	37·9	76	9,888	....
25	48,459	37·3	77	8,822	....
26	47,820	36·6	78	7,764	....
27	47,204	35·9	79	6,851	....
28	46,596	35·3	80	5,988	4·0
29	45,990	34·6	81	5,152	....
30	45,388	33·9	82	4,363	....
31	44,796	33·2	83	3,648	....
32	44,210	32·5	84	3,005	....
33	43,602	31·8	85	2,424	2·8
34	43,003	31·1	86	1,902	....
35	42,404	30·4	87	1,473	....
36	41,811	29·7	88	1,134	....
37	41,207	29·0	89	892	....
38	40,588	28·3	90	683	2·4
39	39,958	27·6	91	518	....
40	39,317	27·0	92	391	....
41	38,655	26·3	93	276	....
42	37,980	25·6	94	193	....
43	37,295	24·9	95	131	1·9
44	36,605	24·3	96	83	....
45	35,919	23·6	97	62	....
46	35,256	22·9	98	40	....
47	34,667	22·2	99	23	....
48	34,082	21·5	100	12	1·0
49	33,498	20·8	101	6	....
50	32,877	20·1	102	2	....
51	32,235	....	103	1	....
52	31,582	....			

MARKS PRODUCED UPON THE BODY BY LIGHTNING STROKE.

We gave on page 107, current volume, an account of some extensive and interesting researches with the great induction coil of the Polytechnic Institution in London, upon the effect produced by lightning stroke on the bodies of animals, so far as these effects might be considered as indications of death. There are, however, some other characteristic effects produced upon the surface of the body by lightning stroke which are worthy of attention. Dr. Richardson, the conductor of the experiments referred to, says that several kinds of injuries to the external parts of the body have been described as following upon the reception of severe shocks from lightning electricity. Some of these have been considered by excellent authorities as chimerical,or as vulgarly-exaggerated descriptions of observed, or presumably observed, facts; they have been left up to this time in singular doubt and obscurity. He has, therefore, now that the means of research are at command, investigated this subject with care, and has been able, by a few simple experiments, to place what had been doubtful in a sound and scientific position. The following marks of injuries have been recorded:

1. Marks of burning of the skin and hair.

2. Impressions on the body of metallic substances, such as coins, ornaments, beads, crosses.

3. Ecchymoses, or vivid blue spots, sometimes accompanied with exudations of blood.

4. Impressions on the body of an arborescent kind, supposed to be impressions of trees or fences near or beneath which the person stood when struck by lightning.

5. Loss of hair.

BURNS.—Burns on the body from lightning or electrical shock are more likely to happen in cases when the person is not destroyed than when the shock is fatal. The reason of this probably is that the burning shock itself is of the flaming rather than of the penetrating kind. The burnings differ in degree; they may be mere singeings of the hair, with superficial scorchings or blisterings of the skin; or they may be extensive cauterizations leading to surrounding inflammatory action. Metallic substances in the dress, such as pins, staybusks, buckles, and the like, while they may, in one sense, have their use in directing the shock from point to point over the body to the earth by a superficial route, lead often to severe local injury. In these cases the parts which are burned are those which lie between the metallic points.

Corroborative of these conclusions of Dr. Richardson, we have now before us an account of a remarkable case of burning by lightning, in the *American Journal of Medical Science.* The victim of the stroke, was struck upon the back of the head, where she had her hair done up in a knot and fastened by two hair pins. The hair was much scorched, and under the knot of hair the skin was severely burned. Thence the electric fluid passed down, burning the lower portion of the right ear, in which was a gold ear-ring; then crossed the throat and passed down to the left of the sternum. The burn thus produced was about three inches wide, covered with blisters. The fluid here left her body, and finding some other conductor, passed down, still on the left side, to just above the crest of the ilium, extending thence forward and backward to the symphysis pubis. This burn was about 12 inches long, and about the same width as the first. The next burn began on the patella of the right knee, extending to the bottom of the heel, in reaching which it wound around the inner side of the leg. The lightning passed off at the bottom of the heel, bursting open the heel-seam of a strongly sewed gaiter boot.

The lightning melted portions of the wires of her hoopskirt, also a small part of the lower end of the steel of her corset. The steel clasp of the elastic garter, the steel of her corset, and the metal of her hoop skirt, appear at several points to have carried off the electric fluid. Had the wound been continuous from head to foot, a fatal result would have been inevitable. As it was, however, the lady recovered.

Dr. Richardson confirms the popular impression, pretty generally, we believe, discredited by scientific men hitherto, that the impressions of metallic substances may be left on the bodies of persons struck by lightning. He says:

"Some years ago an eminent meteorologist of this country forwarded to one of the learned societies the particulars of a case which had been sent to him by a medical man residing in the West Indies. In this case, in which a man was subjected to lightning shock, it was said that impressions of various ornaments were most distinctly left on the body, and, from the manner in which the report was drawn up, it carried with it an air of the strictest probity. The marks, it was said, were of a dark bronze color, and the impressions were so distinct that they could not be doubted. A bracelet or chain was, I believe, stated to be impressed, a coin, and a cross, or similar ornament. On hearing this description, I drew up a short leader upon it, and forwarded the article to the editor of the *Medical Times and Gazette*, who took it at once to Professor Faraday, soliciting his opinion as to the probability of the occurrences described in the report. Faraday listened with much attention, and then observed, that although he would not like to say the phenomena were impossible, he could see no explanation of them, and, indeed, could scarcely admit the validity of the observation. On this, such was my admiration of the great physicist, I withdrew the essay. In these new researches, however, I have recurred to this subject, and have put the question experimentally in different ways, and now I am bound to say, that impressions such as have been referred to, may be faintly struck on the body. Thus, by placing a thin ring of twisted wire on the ear of a white rabbit, and on discharging through the ring from the large Leyden battery, there was unquestionably left on the ear a faint blue line showing the position of the wire, the irregularities caused by the twisting of the wire being also distinctly traceable. In the living animal the appearance quickly fades; in the dead it would of course be left until the organic changes of decomposition removed it. The nature of the mark is very simple; it is an ecchymosis taking the line of the metal, and so presenting a rough outline of the form of the metal. The shock must be received on a firm surface, such as bone."

Simple ecchymoses and livid spots, having no reference to metallic or other bodies in contact with the body, are sometimes presented on the surface of the body in a very marked degree.

Dr. Richardson affirms that marks on the bodies of persons struck by lightning of an aborescent kind—have been noticed, and have naturally, though wrongly, been supposed to be representations of the figures of trees. To the unlearned such a suspicion is easily conveyed,for the arborescence is described as very perfect, the stem, the larger branches, and smaller branches, as of a tree, being marked out with much refinement. To the learned the suspicion has seemed an absurdity, there being no known physical law by which the picture of a tree could be fixed on the body, in miniature, by lightning. The truth, when explained, is very simple. The arborescent appearance may be fully accepted as a fact, and as having been observed in cases of lightning shock; but the arborescence is not the figure of a tree; it is an anatomical outline of the trunk and branches of superficial veins of the body of the subject. More than one hundred and ten years ago, the fact that the veins could thus be penciled out by lightning discharge, was fully described by the illustrious Beccaria, who states minutely that a man struck dead by lightning in a storm was left generally rigid, and exhibited this added and curious phenomenon. The lightning, choosing the best con-

ductor, having struck a vein in the neck, and followed it out to its minutest ramifications, the figure of the vein appeared through the skin, finer than any pencil could have drawn it.

In order to test this explanation Dr. Richardson directed a charge from a Leyden battery through the ear of a white rabbit, from a large trunk of a vein at the base, and in the line of the center of the ear, to the extremity of the organ. One discharge was in this experiment quite sufficient to bring out the figures of two large veins, which appeared like pen marks on the surface. He says:

"Blood in these cases undergoes arrest of its motion, expansion, and possibly decomposition, by which some of the coloring matter is liberated. Thus, the vulgar observation of arborescent marks on the dead after lightning-shock admits of recognition by the most critical, and of explanation by the most simple of scholars. It is often thus that the illiterate, correct in what they have seen in nature, appeal in vain to science, because, impelled by the strongest of all instincts, reason, they connect their facts with some theory of cause which science proclaims to be untenable, and dismisses alike fact and theory with hasty contempt."

The loss of hair as one of the sequences of lightning stroke has also been confirmed by these experiments.

OXFORD WINS.

Harvard and Oxford have had their rowing match, and, as was clearly foreshadowed in the English press, the Harvard boys came within one of beating. The distance, four miles and a half, was made by the Oxonians in 22 minutes and 40½ seconds. The Harvards came in just six seconds behind—very much to their chagrin, no doubt, as they had traveled three thousand miles to play a game in English waters, where they had to contend against the powers of the best oarsmen in the world, and the sympathy of half a million Englishmen who naturally roared loud over the success of their favorites.

It is now freely asserted that the Harvards were over-trained, and that, on the day of the race, Simmons had the diarrhea and Loring was troubled with an angry boil.

Princes, dukes, earls, lords, costermongers, fishmongers, cordwainers, roughs, women, and children, crowded the banks of the Thames, and considerable money changed hands.

Thus ends the boat race about which so much fuss has been made, and the universal Yankee nation is finally whipped for once at least. It becomes us to gracefully acknowledge the corn.

The race was decided at about 37 minutes past 5 o'clock P. M., Greenwich time, and the result known here, owing to the difference in time, a few minutes past one o'clock. The real time occupied in the transmission was twenty-three minutes and thirteen seconds, the greater part of which was consumed in carrying the message on horseback to the nearest telegraph station.

A Luminous Toe.

A lady correspondent wrote to the Boston *Transcript*, that "upon retiring to rest, the gas being out and the room quite dark, the writer's attention was directed to her foot, which was illuminated by light, which, upon examination, was found to be phosphorescent, and proceeded from the upper side of the fourth toe of the right foot. Upon rubbing it with the hand the light increased and followed up the foot, the fumes filling the room with a disagreeable odor. This lasted some time, when the foot was immersed in a basin of water, hoping to quench the light, but to no purpose, for it continued beneath the surface of the water, the fumes rising above. The foot was taken out and wiped dry, but the light still remained. A second immersion of the foot followed, and soap applied, with the same result. No more experiments were tried, and after a time it gradually faded and disappeared. The time occupied by the phenomenon was about three quarters of an hour. The lady's husband substantiates the above facts, as he also witnessed them. Will some one please explain the above, as the emitting of phosphorus from a live body is new to the writer?"

The whole circumstances of the case go to show the presence of phosphorus. We have noticed a like phenomenon, but there is not the slightest necessity for supposing that it was "emitted from the live body."

Galvanic Chain.

"The galvanic chain," says *The Druggist*, "is really an instrument of most ingenious and beautiful construction, and is one of the handiest and most effective which the medical practitioner can employ. It is in the form of a flat flexible chain, and comprises 120 separate pairs of galvanic elements. These consist each of a small zinc tube for the electro-positive portion, surrounded with copper rings, which form the electro-negative. The copper of one pair of elements is hooked into the inner side of the zinc tube preceding, while it is isolated from the zinc of its own pair by a simple but most ingenious set of stitches of thread. This petty flexible battery of 120 pairs is excited by simply dipping it into vinegar, and the links are near enough to retain sufficient fluid by capillary attraction to keep up the action for some time. There is thus constituted a battery yielding a very small quantity of galvanism owing to the small size of the indiviuual elements, but high intensity owing to their number. It easily decomposes water, and of course saline solutions, and may be used to demonstrate the process of electrolysis. For medical purposes it yields a direct current, which is the desideratum for neuralgic affections, very decidedly but not violently. By attaching a little vibrating spring in the course of the conductor it gives a succession of interrupted shocks, such as are useful for muscular and paralytic affections. Most of the cheap and handy electro-magnetic machines, as is well known, give only the interrupted, but not the continuous. The chain is an instrument of power and precision and convenience, and as such we recommend it to our medical brethren for the cases in which galvanism is known to be of use. There is another apparatus, called a belt, also flexible, and containing about forty elements of zinc and copper wire ingeniously interlaced and isolated."

Editorial Summary.

As a general rule, according to experiments by M. Schultz, it has been found that the point of solidification of fluids is lowered by substances dissolved therein, and that gases dissolved in fluids exercise the same effects. Pure acetic acid fuses at 16°; this is lowered to 15·2° when a current of carbonic acid is transmitted through this acid. It is well known that hydrochloric acid gas and ammonia gas lower the freezing temperature of water in which they are dissolved; so do carbonic acid and sulphurous acid gas; and it has been ascertained by M. Schultz that nitrogen, oxygen, and hydrogen gases exert the same effect when dissolved in water. Numerous experiments were made by him with the view of ascertaining the effect of an increase of pressure brought to bear upon the absorption of various gases by water, and the lowering of the freezing point of that liquid in consequence thereof. By the phenomenon of regelation is understood that property exhibited by ice of freezing together to a solid mass, when pieces of that substance are pressed together at the temperatare of 0°. After quoting the opinions of Messrs. Faraday, Forbes, Thomson, and Helmholtz on this subject, the author says: "When we take it for granted that regelation is the formation of ice from water anew, we must bear in mind that only pure water, or water, at least, not saturated with air, is suitable for this purpose."

THE English papers state that 20,087,809 passengers availed themselves of the London Underground Railroad for the half year ending July 30, and that a complete extension of this means of communication is soon to be commenced. Day by day the necessity for similar facilities of travel in this city is becoming more and more apparent; and the difficulties of constructing an underground railroad will only be increased by delay. Workers in this great center of industry are only too sensible of the advantages which would be afforded by an unimpeded and expeditious system of conveyance. There is no lack of capital to begin and complete such an undertaking, and the inventive genius of the country can place in the hands of those willing to engage in the work, means and appliances which will render an underground way here incomparably safer and more healthful than that now established in London. Besides the certainty of receiving handsome returns for the money invested, the promoters of this enterprise will enjoy the satisfaction of having done much to further the public welfare.

THE Melbourne papers give some particulars relative to a meat-preserving process, the merits of which, it would appear, had been satisfactorily tested. The meat having been cured was taken on a voyage to England and back in the ship *Mary Thompson*. The meat was in a cask, and had been preserved in fat. The Captain of the vessel exposed the meat to very severe trials on the way home, placing the cask on deck for days together under a tropical sun, and at other times leaving it for lengthened periods in the neighborhood of the cook's galley. When the cask was opened, the meat proved to be in a perfectly sound condition, and was capital eating. The advantage of the process over others is that the meat is preserved in large joints, from which, however, all bone is extracted before they are placed in the cask. A little bisulphate of lime is used in the operation of curing, but its taste was not in the slightest degree perceptible.

THE Brooklyn *Union* says that in connection with the erection of the East River bridge, the Brooklyn terminus of which is to be the site of St. Ann's Episcopal Church, corner of Washington and Sands streets, a plan has been discussed for widening Washington street on the westerly side, making it one hundred feet in width, with twenty feet promenade sidewalks on each side of the carriage-way extending from the bridge terminus to the City Hall square. It is understood that the Government has arranged for the purchase of of the church property situated at the corner of Washington and Johnson streets, and that at the next meeting of Congress an appropriation will be made of money to erect on it a post office and United States Court building.

THE workingmen of England are determined that the productions of their brains are not to be at the mercy of unprincipled capitalists. One indication is given by the following. A deputation lately waited upon John Bright, at the office of the Board of Trade, for the purpose of asking him to bring in a bill early next session to protect the inventions that might be exhibited at the Workingmen's International Exhibition to be held next year. Mr. Bright expressed his entire sympathy with the object of the deputation, and promised to comply with their request.

A COMMITTEE appointed by the French Academy of Sciences have under consideration a communication by M. Berthault. This gentleman suggests various means of utilizing the excess of force produced in working a locomotive. He shows that it might be used in causing a stronger adhesion of the wheels to the rails, so as to prevent the train from running off, and that it might likewise be applied to the illumination of the carriages by electricity, and even to setting the telegraph in motion.

PROTECTION OF WOOD FROM FIRE.—We learn from the *Deutsche Industrie Zeitung* of July 1, that at one of the collieries at Ibbenbüren, Westphalia, the woodwork is protected from fire by being painted with a mixture consisting of 5 parts of alum, 7 parts of rye-meal paste, and 30 parts of previously washed, *i. e.*, finely divided, clay (this mixture is used for woodwork not exposed to open air); for woodwork, so exposed, a mixture is used consisting of 2½ parts of crystallized sal ammoniac, 1 part of white vitriol (commercial sulphate of zinc), 2 parts of joiners' glue, 20 parts of zinc white, and 30 parts of water. These mixtures have been found to prevent wood bursting into flame on ignition, and to greatly delay its destruction even when severe fires are raging.

AN OLD SWINDLE REVIVED.—Dailey & Co., No. 208 Broadway, N. Y., recently advertised in our paper for agents to sell a certain article. The notice was handed to us by a respectable advertising agent, and we had no suspicion that it was intended to perpetrate a swindle, but it appears to be a renewal of the old counterfeit money dodge. A perusal of this circular itself will at once show its true character, and no honest person can be deceived by it. Nevertheless we consider it our duty to expose the villains. We placed the circular in the hands of the authorities some days ago.

ANOTHER cable is coming soon, a concession having been granted by Count Bismarck to a company for the laying of a submarine cable between Northern Germany and the United States, the landing of that cable at a suitable point of the North German coast on the North Sea; and the construction of all appliances required for working the cable, which is to be constructed in the best known manner, and its manufacture is to be commenced within six months after the date of the concession, and the whole line to be completed within two years after that date.

THE freight opposition among the railroad companies which gave the public the temporary advantage of transporting goods to the West at low rates, as noticed in last week's issue, shows symptoms of abating, and a return to the old tariff may soon be expected. Erie and the New York Central have raised their prices to 38 cents per hundred pounds to Chicago. Since August 2, when the low rates commenced, the depots have been filled with Western-bound freight.

THE surveys for the East River Bridge are now finished, and the line of the bridge and approaches located. The timber for the founding of the piers is now lying at Red Hook, ready to be bolted together, previous to being sunk into position. It is thought by some that it will take three years before the work is so far advanced as to enable the cables to be stretched across the river, and that six years will elapse before the bridge can be thrown open to the public.

A METHOD of protecting iron vessels against rust and corrosion has been proposed by MM. Dance and Bertin. They contemplate the conversion of the hull of the iron vessel into a galvanic battery, by placing, inside the hull, pipes and tanks made of zinc and filled with sea water, and connected by means of bolts and rivets in metallic contact with the outer side of the vessel. They also design to use strips of zinc on the iron plates of the vessel immersed in the water.

THE London *Daily News* in an article on the new patent law of Canada says that the whole principle and practice of that law may be concisely summed up in the word "spoliation." A pretty plain hint is also given to the Canadians that a persistence in such a policy, which is shown also in all their outside relations, is more than likely one of these days to result in their being thrown entirely on their own resources.

THE leather and hide trade of Nashville has greatly increased since the war. The Nashville butchers take off about ten thousand hides a year, and nearly that number of Texas and Mexican hides arrives there during the same period. There were three hundred and seventy tanners in Tennessee before the war, and more than five times as much leather was made then as now.

ON the railroads in France electricity is taking the place of human watchfulness. On many lines there are contrivances where the passing of a train is automatically announced to neighboring stations. The cars pass over connecting wires, and the train records itself before and behind, so that its progress and appearance are alike indicated.

KEY RINGS.—We have received from C. A. Wentworth, Boston, Mass., specimens of some neat rings for holding bunches of keys, made after his patent. After the keys are put on, the ring springs to its place and is secured by a slotted button, the whole forming a very useful device for the purpose.

THE Chinese laborers are making advances into the country. A dispatch says that five hundred will shortly be sent to St. Joseph, Missouri, whence they will be distributed to various points, and that agencies are to be established there, and at St. Louis and Springfield in the same State.

AN exchange says it has been discovered that the common hardhack, *Spiræa tomentosa*, that grows plentifully in nearly every pasture, can be used in tanning leather as a substitute for sumac. A company has been formed in Boston which has advertised for one hundred tuns of hardhack.

A NEW steam roller, weighing fifteen tuns, recently ordered from England for Prospect Park, Brooklyn, has arrived. It is to be put into operation at an early day.

INJUNCTION IN PATENT CASES.

Though right to an injunction and profits be clear, it appears, from the following decision, that a provisional injunction will not be allowed to the prejudice of an established business if the patentee has delayed enforcing his right an unreasonable time.

George H. Corliss vs. The Dry Dock Rolling Mill, Ingham Coryell, and John Thompson.—NELSON, C. J.—This is a motion for an injunction to restrain the defendants from infringing the patented invention of the complainant for a certain "new and useful improvement in cut-off and working valves of steam engines." The patent is dated March 10, 1849. The suit is founded on a reissue dated July 12, 1859, and which was extended by the Commissioner of Patents for seven years from the 10th of March, 1863. This patent has heretofore been under our consideration in the case of Corliss vs. The Wheeler & Wilson Manufacturing Company, in the district of Connecticut, September, 1861. In that case the main defense rested upon a patent granted to Noble T. Green, the 15th of March, 1855. A decree was rendered in favor of the complainant. The defense in the present case rests mainly upon a patent granted to William Wright, dated November 20, 1866.

The present suit was commenced in June, 1868. The patent on which it is founded expires on the 10th of March, 1870, within about a year and nine months after the commencement of the suit, and some seven months hence. There is no suggestion or evidence before us that the defendants are irresponsible or unable to pay any amount of profits that may be ultimately recovered against them, on the final hearing of the case, upon the pleadings and proofs; and, in the absence of such evidence, however satisfied we may be as to the right of the complainant to such profits and to an injunction against infringement, if the application had been made at an earlier period of the term of the patent, we think it would be unreasonable, and not agreeable to the course of proceeding in equity in the case presented, to interfere and break up the establishment and business of the defendants. On the above grounds we must deny the motion.

Motion for injunction denied.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

There is a great probability that a new telegraph cable will be laid between America and Ireland. This will be the sixth cable that is to connect the old world with the new, counting the three that are already laid down.

On the 25th of August, 161 cars laden with peaches, arrived in Jersey city, containing 82,000 baskets, the largest quantity ever brought in on one day.

It is announced that ninety miles have been graded of the trans-isthmian railway on the Spanish Honduras route from Puerto Cabello, on the Gulf of Honduras, to Amecpola, on the bay of Fonseca, on the Pacific side. The rails for the road are arriving every week, at Puerto Cabello, which has been declared a free port. In crossing from the Gulf of Mexico to the Pacific Ocean, the railroad, it is stated, overcomes an elevation of three thousand feet. When the road is completed, it is computed that the passage to California will be shortened by a week's time.

There are now engaged in the Mississippi trade nine hundred and ten steamers with a capacity of 202,174 tuns, and of an estimated value of $34,536,000. More steamboats are enrolled at St. Paul than at any other port on the river proper, except St. Louis, New Orleans, and Memphis.

The value of the boots and shoes manufactured in Massachusetts this year is expected to exceed $35,000,000. The wholesale dealers in Boston are forming a Shoe and Leather Dealers' Exchange. Since January 1, nearly 800,000 cases of goods have been shipped from that city, an excess of fully thirty-three per cent over the corresponding period last year.

The Denver, Colorado, *News* reports some rich silver discoveries made near Blue river, above Breckinridge. Assays made at the mint run from $150 to $300 per tun of ore.

The old stone house in Guilford, Connecticut, the oldest one on the continent, built in 1649 for a fort, where all the inhabitants of the town gathered every night, to be secure from the Indians, is undergoing extensive repairs, the original model, however, being carefully retained.

At Stockholm, Sweden, when a sewer was dug recently, the hull of a vessel was found eleven feet under ground, which is thought to have been there about three hundred years.

The great "mass" of property recently found in one of the Superior mines has the following dimensions: length, 65 feet; hight, 32 feet; thickness, about 2 feet; giving a total of 4,160 cubic feet. The purity of the mass is estimated at 65 per cent. This would give a total of 882 tuns, making it by far the largest mass of copper ever found on Lake Superior or in the world.

Refrigerator cars are to be used in transporting California fruit to the East, to return loaded with butter, oysters, and other articles which the Californians need.

A raft of lumber lately passed by Winona down the Mississippi river, which measured over three acres in surface, and contained 2,200,000 feet of lumber.

The Maine Central and European and North American Railway Companies have agreed to carry and return stock and other articles for the New England Fair free of expense, and passengers at half price.

The Portsmouth Navy yard has lately received an accession to the working force of sixty carpenters and several joiners, making the number of employés about 1,500. Business has become somewhat more animated there.

The manufacturers of Fall River, Mass., have decided to run the mills but three days in the week for the present, the price for goods produced not covering the cost of production.

A submarine telegraph from Rangoon, by way of Singapore to the island of Java, and thence to China, is projected.

Twenty-six million gallons of water were pumped into the new reservoir at East New York on the 28th of August. A new pumping engine is nearly completed. The supply of water is ample for all purposes.

NEW PUBLICATIONS.

A NEW EXPOSITION OF THE LEADING FACTS OF GEOLOGY. Including a Disquisition upon the Origin and Formation of Petroleum and Coal. By Gideon Frost. New York: The Trow & Smith Book Manufacturing Company, 48 and 50 Greene street.

Under this heading has recently been published a small work professing to controvert many of the geological theories which have received the assent of the most noted geologists of this country and of Europe. It moreover theorizes upon subjects respecting which celebrated geologists have either not essayed a theory, or respecting which there is no general agreement among them. We cannot coincide with the conclusions of the author, although we have been interested in his views.

SUBMARINE BLASTING IN BOSTON HARBOR, MASS. Removal of Tower and Corwin Rocks. By John G. Foster, Lieutenant-Colonel of Engineers, and Brevet Major-General U. S. A. With Illustrations. New York: D. Van Nostrand, 23 Murray street, and 27 Warren street.

This is an interesting and instructive account of an important engineering work, successfully accomplished during the years 1867 and 1868, notwithstanding many difficulties were met with in its progress. Full details are given of all the apparatus and methods employed in the operation, and the work cannot fail to prove valuable to all interested in submarine engineering work.

Inventions Patented in England by Americans.

[Compiled from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

1,735.—FABRICS FOR TRIMMINGS.—Geo. E. King New York city. June 4, 1869.

2,215.—TOOL FOR HOLDING AND DRIVING BRADS.—M. D. Converse, London, Ohio. July 21, 1869.

2,275.—CARRIAGE AXLE.—M. J. Frisbie, New York city. July 27, 1869.

2,285.—APPARATUS FOR FACILITATING THE GRINDING OF THE KNIVES OF HARVESTING MACHINES.—Charles Coventry and Wm. Boynton, Auburn, N. Y. July 28, 1869.

2,297.—APPLICATION OF SPRINGS TO SEATS AND BEDS.—E. H. Robinson, Providence, R. I. July 29, 1869.

2,345.—LIQUID AND GAS METER.—W. Hamilton, Toronto, Canada, and H. Kimball, Randolph, Vt. August 5, 1869.

2,368.—MACHINERY FOR COMBING FIBROUS MATERIALS.—H. Conant, North Providence, R. I. August 7, 1869.

2,399.—METALLIC CARTRIDGE.—E. Martin, Springfield, Ill. August, 10, 1869.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; beside, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at $1·00 a line, under the head of "Business and Personal."

☞ *All reference to back numbers should be by volume and page.*

S. M. P., of Minn.—Callan's compound cast-iron battery, about which you ask, is fully described in the *Philosophical Magazine*, Vol. XXVIII, page 49. As you may not be able to get access to that work, we will say that it consisted of 300 cast-iron cells, each containing a porous cell and a zinc plate four inches square, 110 cast-iron cells with porous cylinders and zinc plates 6 inches by 4 inches, and 177 cast-iron cells, each containing a porous cell and zinc plate 6 inches square. There were, therefore, 577 elements containing 96 square feet of zinc and 200 square feet of cast iron. The porous cells contained dilute nitro-sulphuric acid, and the cast-iron cells contained *strong* nitro-sulphuric acid. It was, of course, a powerful battery. Animals were instantly killed by its discharge.

J. W. S., of Mass.—The ups and downs in a water pipe running from a distant spring to a pump, unless one or more of them exceed the hight to which water can be raised by an atmospheric pump in the locality named, will not affect the working of the pump except to add to the friction of the water column, thus absorbing power. The nearer you can place the pump down to the level of the spring the less power will be required to work it. You are right in supposing you will get the effect of a siphon in the case you mention.

J. G. M., of Ala.—The shaft for driving your looms should make as nearly as may be, the same number of revolutions per minute as the loom makes picks. In other words, the pulleys on the line shaft and the loom pulleys should be of the same diameter. It is considered better practice to speed up as near to the prime mover as possible than contrawise, as that allows lighter shafting and so reduces not only first cost but subsequent friction.

A. B., of N. J.—The cement of which you inquire is made by dissolving enough gutta-percha in a mixture of ten parts of bisulphide of carbon and one of oil of turpentine to form a thick compound. It is a strong cement and holds leather very firmly provided all oil is removed from the surfaces to be united. The pieces, after they are put together with this cement, should be held firmly together until perfectly dry.

P. R., of Ohio.—The chemical composition of urea is expressed by the formula $C_2 H_4 O_2 N_2$, that is 2 equivalents of carbon, 4 equivalents of hydrogen, 2 equivalents of oxygen, and 2 equivalents of nitrogen. As the equivalent of carbon is 6, that of hydrogen 1, that of oxygen 8, and of nitrogen 14, the proportional weights of each element are, of carbon 12, hydrogen 4, oxygen 16, nitrogen 28.

G. H. W., of N. H.—The authorities to which you refer give the generally accepted theory of the action of the injector. To understand the action of that ingenious device, a good understanding of elementary principles is necessary. We could hardly make it plainer to you even by an extended essay, much less in the space we can give you in this column.

H. C. C., of Ind.—There are several processes now on trial for preserving and transporting meats from South America, and other localities where they are now wasted, to places where they can be used as food. Some of these promise well. You will find numerous allusions to them in back numbers of our paper.

A. B., of Va.—You cannot successfully melt iron with the common appliances used for melting the more fusible metals and cast it, neither can you, in our opinion, spin a piece of common plate tin into the shape desired in a lathe. With some of the very best and heaviest qualities you might perhaps succeed but we think it doubtful.

D. T. T., of N. Y.—The data given for computing the diameter of the small piston to your hydraulic press and its length of stroke are insufficient. You should in addition to the diameter of the large piston, and the resistance it must overcome at each stroke through a distance of one half an inch, also give the power applied to the smaller piston.

D. P. R., of Pa.—There are very few structures which possess greater strength in proportion to weight than paper tubes laid up with good glue. An exterior coat of shellac will protect them from the action of moisture. The interior may be protected by stopping the ends with good corks and coating the ends of the corks with sealing wax.

R. H. D., of Tenn.—You can extract the moisture from the air under a glass receiver, by placing therein a small open vessel containing strong sulphuric acid; or you may dry air, by passing it over lumps of quicklime. The choice of the methods must depend upon the circumstances of the case, which you do not give us.

R. S., of Mass.—Your method for binding schoolbooks is undoubtedly new, and from the somewhat vague idea we get from your description of it, we think it would succeed. A method sufficiently cheap and more substantial than the present is imperatively demanded.

R. G., of N. Y.—Good glue is the best material to fix emery to cloth or leather. It should be used freely and allowed to get very dry and hard previous to using. Emery belts ought not to be run on too small pulleys, as they crack the glue much more than large ones.

F. C. B., of N. Y.—We have not met with either the alloy or the liquid you mention. We are therefore unable to give you the information you seek.

J. S., of Pa.—We have read your communication with interest and agree with you on many points, yet we do not think it best to give place to communications on such subjects.

R. C., of Me.—The specimen of peroxide of manganese sent is in our opinion too impure for use in glass manufacture. It contains iron in considerable quantity.

W. J. B., of Ohio.—Case-hardened iron expands more by the action of heat than steel, and less than iron not case-hardened, by a very slight quantity.

J. S. P., of S. C.—To make a good whitewash for inside work, use only lime and water with a little good white glue or isinglass.

S. K. Van D., of Iowa.—Mottled iron is a mixture of white and gray irons. It takes its name from its spotted appearance.

E. E., of N. C.—The periodicity of the occurrence of the great meteoric showers was determined not by calculation but by observation.

W. C., of N. Y.—If you will daub some gas tar about the holes of rats they will vacate the premises.

J. F., of Ky.—The flow of rivers is more rapid in high water than in low water.

D. G., of Ill.—The term "Macadam," applied to roads, is the name of the inventor of the road. It was invented about 1783, and subsequently elaborated in practice in the roads of Bristol in England where it was first used.

S. N., of Ohio.—You can obtain brass rods already formed for small pinions of six teeth at dealers' in such articles. All you will have to do will be to turn down the bearings.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per line will be charged.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

PREPARING PETROLEUM.—H. J. Berg, Butler, Pa.—This invention relates to a new and useful improvement in preparing petroleum for market; and it consists in separating from it the lighter and more volative substances, as benzine and naphtha, which are combined with, or held in suspension by the crude petroleum as it is taken from the wells.

CURTAIN FIXTURE.—John W. King, New York city.—This invention relates to that portion of a window curtain fixture which is called the "roller" to which the curtain is attached and from which it is suspended.

PUMP.—M. C. Hawkins, Edinboro', Pa.—This invention relates to a new and useful improvement in pumps, designed for combined forcing and lifting pumps.

HOE.—J. F. Wilson, Athens, Ga.—This invention relates to a new and useful improvement in the construction of hoes for agricultural and other purposes.

CANT HOOKS.—Peter Shults, Rockwood, N. Y.—The object of this invention is to furnish a cant hook for moving heavy bodies, as saw logs, stones, etc., which shall be adapted to more general use than cant hooks of ordinary construction.

COMBINED HAY RAKE AND SPREADER.—Henry C. Varaum, Hartford, Vt.—This invention has for its object to furnish a simple and convenient machine for raking and spreading hay, which shall be so constructed and arranged that it may be readily adjusted for either use, doing its work well and thoroughly in either capacity.

SLEIGH BELL.—George W. Lamb, Cobalt, Conn.—This invention has for its object to furnish an improved mode of attaching sleigh bells to their straps, so that they may be conveniently attached and detached, and so that they cannot turn in said strap, and that they will be held securely.

CLARIFYING CANE JUICE.—Adonis Labauve, Convent, La.—This invention has for its object to furnish an improvement in clarifying cane juice and other liquids with sulphuric acid, which shall be simple and effective and conveniently applied.

ATTACHMENT FOR SIDE WALL REGISTERS.—J. M. W. Kitchen, Brooklyn, N. Y.—This invention has for its object to furnish an improved attachment for side wall registers, to enable people to conveniently warm their feet at such registers, and which shall be so constructed and arranged that, when not required for use, it may be closed up so as to be out of the way, and so as not to disfigure the register.

ROCK DRILLER.—Wm. F. Banks, Brookfield, Conn.—This invention has for its object to furnish an improved machine for drilling rocks, which shall be simple in construction, easily operated, and effective in operation, and which shall be so constructed and arranged that the holes may be drilled at any desired angle.

PRINTERS' GALLEY.—James Wilson, Jr., New York city.—This invention has for its object to furnish an improved printers' galley, by the use of which the time lost in making register on book forms, and the enormous wear and tear of type, under the planer and on the press, when off their feet, may be very greatly diminished, and which shall, at the same time, be simple and inexpensive in construction.

FLEXIBLE WAINSCOT.—John F. Wor'h, Brooklyn, N. Y.—This invention has for its object to furnish an improved board lining for walls and ceilings which may also be used for partitions in offices or other rooms, for casing steam cylinders, and for other similar uses, and which shall at the same time be simple in construction and flexible, being capable of adjustment to angles or curved surfaces.

UPHOLSTERERS' PICKER.—Harris W. Axford, Richmond, Ind.—This invention relates to a new upholsterers' picker, which is intended to pick hair or moss from old furniture, and to prepare it so that it can be used over again.

MANUFACTURE OF WOODEN TRUNKS.—Jacob Lagowitz, Newark, N. J.—This invention relates to a new manner of manufacturing wooden trunks, with a view of adapting the process to the use of machinery, so that the trunks can be quickly and cheaply made. The invention consists more particularly in the manner of treating the separate boards before they are put together to form the trunk.

BUTTER MACHINE.—D. Rogers, Mount Gilead, Ohio.—This invention relates to a new machine for agitating butter after the same has been produced in a churn. The invention consists in a novel arrangement of a conical vessel containing a revolving toothed cone with beveled teeth, whereby the butter is gradually carried from one end of the vessel to the other and thoroughly cut up and agitated during the passage.

RAILROAD CAR SPITTOON.—J. S. Du Bois, St. Louis, Mo.—This invention relates to a new spittoon, to be fitted through the floor of a railroad car, so that it will at once let all liquid matter escape, while solid articles, such as cigar stumps, tobacco, etc., will be retained in it until discharged by turning the bottom of the spittoon.

MAGNETO-ELECTRIC MACHINE.—D. F. J. Lontin and E. L. C. d'Ivernois Paris, France.—This invention, which comprises new arrangements and applications of the magneto-electric machine, consists in certain improvements upon that class of machines which have, upon the same rotating axis, several bi-branched soft-iron armatures having the form of electro-magnets, but non-magnetized, and the parts or poles of which (were these armatures magnetized) are placed on the same circumference, the curve of which they assume; second, in uniting several electro-magnets (magnetized one first time from any source), fitted outside the circumference described by the soft-iron armatures, so that their poles may be placed very close and in a concentrical circumference to the former one.

BOLT AND RIVET MACHINE.—David G. Morris, Catasauqua, Pa.—This invention consists in an improved arrangement of the sliding clamping die holder and its operating devices; also in an improved arrangement of the cutters, and also in an improved arrangement for varying the throw of the header slide.

UMBRELLA.—Thos. McCreary, Matteawan, N. Y.—This invention relates to improvements in the construction of frames for umbrellas, whereby it is designed to provide a more simple and durable construction than the present arrangement, and also better adapted for restoring the ribs or braces when broken.

STOVE.—M. R. Barr and W. T. Black, Erie, Pa.—This invention relates to an improved oven attachment for base-burning stoves, and has for its object to provide an attachment, under an arrangement calculated to be useful not only for baking but for cooking in other ways, as frying, stewing etc., and so that the heat shall pass directly under and around the exterior of the oven or not, as required.

AUTOMATIC FIRE LIGHTER AND ALARM.—John Rigby, Fort Howard, Wis.—This invention consists in an arrangement of a rotary disk to be operated by a spring, and held in check by a catch, to be disconnected by a weight, let fall by the action of the hour hand of a clock, for allowing the spring to operate the disk when required, which rotary disk carries a piece of sand, paper to scrape a match, the end of which is held against the scraper. This match is so arranged as to light a wick saturated with oil, and arranged to give a sufficient flame, and to burn long enough to waken persons sleeping in the room.

BUGGY TOPS.—J. S. Wayne, Quincy, Ill.—The object of this invention is to provide an elastic support for the bows of buggy tops when turned down, to prevent the wear and danger of breaking to which they are now exposed, when they rest on the rear prop, and over which they project about two thirds of their length; also, to prevent the wrinkling of the leather portion of the top between the two rear bows.

CATCHES FOR TABLE LEGS.—John M. Lemon, Polk City, Iowa.—The object of this invention is to provide simple and efficient floor catches for table legs, to hold tables steadily and prevent them from rolling over the floor when ironing upon them, or doing other kinds of work liable to cause them to move about, and applicable also to other articles of furniture.

ADJUSTABLE SPRING.—Wm. Evans, Eureka, Wis.—This invention relates to improvements in springs, whereby it is designed to provide a simple and cheap adjustable spring especially adapted for wagon springs, which may be readily adjusted to maintain the proper degree of springing qualities for carrying light or heavy loads.

FRICTION POWER.—John B. Bolinger, Detroit, Mich.—This invention consists in a peculiar construction and arrangement of a friction pawl grooved pulley and loose pulley, the latter being arranged on the driving shaft and having an oscillating movement imparted to it by a treadle belt and spring in the usual way.

HARROW.—Fenton Y. Tavenner, John W. Galbraith, and Alfred Smith, Sedalia, Mo.—This invention relates to improvements in harrows intended to facilitate cleaning the teeth when clogged with straw, grass, roots, etc., and to provide an arrangement whereby the teeth may be so adjusted that they may be prevented from engaging with the ground, when it is designed to move the harrow from one field to another, or along a road.

REVERSIBLE PLOW.—John W. Jones, Thomson, Ill.—The mold board in this invention is made in two parts and suspended on vertical posts, the rear one being a crank shaft, and provided at the bottom above the runner with a supporting frame for the rear part of the mold board, to which the front part is connected by two connecting rods to cause the two parts to vibrate simultaneously. The rear part is also provided with a locking device for securing the said double mold board at either side.

REMOVABLE SAW TEETH.—J. Newton, New York city.—This invention relates to improvements in the arrangement of removable saw teeth, and the means of holding them in the saw plate, calculated to provide a ready means of inserting, removing, or adjusting them, and of holding them in the required positions by the frictional action of springs, arranged to be capable of imparting the required amount of friction without danger of warping or buckling the saw plates. It also relates to an improved adjusting instrument for releasing the frictional contact of the springs to adjust the teeth.

WASHING MACHINE.—C. A. Calaway, Madison, Ohio.—The invention consists in an improved construction and arrangement of a concaved grooved bed in the bottom of a case, or tub, a pair of rollers pivoted to an oscillating frame, and a treadle device for varying the pressure of the oscillating rollers upon the bed, or the clothes thereon.

SPRING BED BOTTOM.—Joseph Moore, Tarentum, Pa.—This invention consists in supporting the longitudinal spring bars upon transverse bars, one near each end, which are suspended by spring followers inclosed in suitable cases on the said cross bars, and connected by straps to the frame of the bedstead in such a way that the followers work out and in, in connection with long elastic springs as the pressure varies.

CULTIVATOR.—Isaiah Henton, Shelbyville, Ill.—This invention has for its object to improve the construction of the improved cultivator patented by the same inventor, March 6, 1866, and numbered 52,998, so as to make it more convenient, satisfactory, and efficient in operation. Patented July 13, 1869.

WASHING MACHINE.—Jerome B. King, New York city.—This invention consists of a rotating cylinder and expansible casing for the same, within which the said cylinder works; the clothes to be washed being placed in the space between the surfaces of each, and subjected to a squeezing pressure imparted to the casing by springs, cords, and weights, or other means while rotary motion is imparted to either the cylinder or casing, and both are immersed in water contained in an exterior tub or case.

COMBINED HORSE COLLAR AND TREE.—Howard Connick, Albert Lea, Minn.—This invention consists in an arrangement of collar tree or hame in two sections, connected by hinge joints to a stock, maintaining them in the proper relations and positions, and supporting the rein ring and the loops for the attachment of the top buckling strap. It also comprises an adjustable tag connection, also an improved buckle attachment for the lower hame strap.

SEEDING MACHINE.—W. A. Van Brunt, Horicon, Wis.—The object of this invention is to improve the construction of seeding machines by the application of new devices for adjusting the teeth and their drag bars, and a novel construction of the boxes inclosing the feed cylinders.

CLOCK ESCAPEMENT.—Michael Tromly, Cincinnati, Ohio.—The object of this invention is to improve the pendulum escapement of a clock in such a manner as to diminish the rigidity and consequent friction of the working parts, and to secure greater smoothness and uniformity of action, and more ready and perfect adjustability.

MACHINE FOR MAKING SOD FENCES.—Jairus Osgood, Blue Hill, Me.—The object of this invention is to provide for public use a machine, so constructed and operating, that it will cut and raise successive sods from the ground deposit them, one on another, and press them down, so as to form a neat and compact sod fence.

HORSESHOE NAIL AND SWAGING MACHINE.—D. J. Farmer, Wheeling, W. Va.—This invention has for its object to simplify the construction and render more convenient and effective the operation of machines for making horseshoe nails, and for swaging iron into the form required for such nails and other small articles.

GARDEN IMPLEMENT.—Henry Miller, Roadside, Va.—This invention consists in adapting to one stock a variety of different instruments; to wit: a shovel, which being reversed, may be used as a plow, a four-edged hoe, a circular hoe, a reversible coulter, a roller, a rake, and a transplanter, all which may be used in succession, with very little trouble of adjustment.

GANG PLOW AND CULTIVATOR.—Freeman F. Reynolds, Bethany, Ga.—The object of this invention is to provide a simple, convenient, and effective method of adjusting the plows, so that they will run at any desired distance from the central beam, and can be readily changed and adapted to the different purposes for which they may be required.

METHOD OF POTENTIATING SUBSTANCES.—Bernhardt Fincke, Brooklyn N. Y.—This invention consists in facilitating and improving the process of potentiation, which is a process for gradually lessening and refining substances, by means of an indifferent vehicle in certain proportions, and, more particularly the process of potentiation by dilution, so as to obtain higher potencies than ever reached before, and in less time and with less labor and expense than it could be done without this invention.

VELOCIPEDE.—A. Combs, Helena, Montana Territory.—This invention relates to a new manner of propelling velocipedes, of steering the same, and of arranging an elastic support. The object of the invention is to simplify the construction of the apparatus, to facilitate its operation, and to improve its appearance.

WAGON REACH AND HOUNDS.—W. R. Santley, New London, Ohio.—This invention relates to an improvement in the construction of the reaches and hounds of wagons and carriages, and consists in making the reach and hounds of a single piece of wood.

CORK-CUTTING MACHINE.—Edmund A. Brimson, New York city.—This invention relates to new and useful improvements in machines for cutting corks.

LAMP EXTINGUISHER.—Wm. Grayson and C. D. Hyndman, Odell, Ill.—This invention relates to a new and useful improvement in the mode of extinguishing the light and fire of kerosene lamps, but applicable to lamps in which other fluids are burned.

PUMP.—Charles Powell, Birmingham, England, now of Newton Brook, York county, Dominion of Canada.—This invention relates to certain new and useful improvements in pumps and hose and rod connections therefor.

FANNING MILL.—T. B. Kirkwood, Dublin, Ind.—This invention has for its object to improve the construction of fanning mills so that they may be simpler in construction, more effective in operation, and less expensive in manufacture, the screen shoe being no longer necessary.

WASHING MACHINE.—Alexander King and G. H. King, Painesville, Ohio.—This invention has for its object to furnish an improved washing machine, which shall be simple in construction and effective in operation, doing its work quickly and thoroughly.

SHOVEL PLOW.—Gregory Jennings, West Cairo, Ohio.—This invention has for its object to improve the construction of the shovel-plow for which letters patented No. 81,173 were granted to Aaron Jennings, August 18, 1868, so as to make it more convenient and effective in use.

COMBINED ROLLER, HARROW, AND DRILL.—Samuel Bradbury, Dresden, Mo.—This invention has for its object to furnish an improved combined harrow, roller, and drill, which shall be so constructed and arranged that the roller may be used alone, or the roller and harrow, or the roller and drill, or the roller, harrow, and drill, as the circumstances of the case may render advisable, doing its work well in either capacity.

JUMP SEATS FOR CARRIAGES.—W. H. Gregg and W. Bowe, Wilmington, Del.—This invention has for its object to improve the construction of that class of carriage seats known as "jump seats," so as to make them self-supporting, and, at the same time, strong and simple in construction, and convenient in operation.

CLOTHES FRAME.—Darwin E. Crosby and Sarah E. Strickland, South Vineland, N. J.—This invention has for its object to furnish an improved clothes frame, which shall be so constructed and arranged that ladies' dresses, and other articles that cannot be folded without being wrinkled, may be conveniently hung from it.

HAIR TRIGGER.—F. Schenck, San Antonio, Texas.—This invention relates to the arrangement of a hair trigger, of such a construction that it may be applied to any of that class of firearms which have but one notch in the hammer for the cocked position of the same. When a fly is used in the hammer it may be applied also to such arms that have a second or rest notch in the hammer.

HAIR TRIGGER.—F. Schenck, San Antonio, Texas.—This invention relates to the arrangement of a hair trigger, so complete in itself that the application of the same to any one of those firearms that have a guard and a trigger, may be effected without the slightest alteration of the interior mechanism of the gun lock, not even necessitating the application of a fly in the hammer, to prevent the catching of the trigger in the rest notch of the hammer.

MANUFACTURE OF BRICK.—Smith D. Arnold, Pittsfield, Mass.—This invention relates to a new method of preparing non-pressed brick for use, with an object of obtaining smooth fronts and tight joints.

Official List of Patents.

Issued by the United States Patent Office.

FOR THE WEEK ENDING AUG. 24, 1869.

Reported Officially for the Scientific American.

SCHEDULE OF PATENT OFFICE FEES:

On each caveat $10
On filing each application for a Patent (seventeen years) $15
On issuing each original Patent $20
On appeal to Commissioner of Patents $20
On application for Reissue $30
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On granting the Extension $50
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In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay $500 on application.

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A sketch from the model or drawing, relating to such portion of a machine as the Claim covers, from $1
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The full Specification of any patent issued since Nov. 20, 1866, at which time the Patent Office commenced printing them ..... $1·25
Official Copies of Drawings of any patent issued since 1836, we can supply at a reasonable cost, the price depending upon the amount of labor involved and the number of views.
Full information, as to price of drawings, in each case, may be had by address ing

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93,944.—MANUFACTURE OF BRICKS.—Smith D. Arnold, Pittsfield, Mass.
93,945.—TRUCK FOR STREET CARS.—Josiah Ashenfelder, Philadelphia, Pa.
93,946.—PICKER FOR WOOL, ETC.—Harris W. Axford, Richmond, Ind.
93,947.—ROCK-DRILLING APPARATUS.—Wm. F. Banks, Brookfield, Conn.
93,948.—BASE-BURNING STOVE.—M. R. Barr and William T Black, Erie, Pa.
93,949.—SCYTHE.—John F. Bartlett, Winchester, Conn.
93,950.—BUSTLE.—Myron H. Beckworth, Camden, N. Y.
93,951.—DIE FOR FORMING CARRIAGE-SHAFT SHACKLES.—Henry M. Beecher, Plantsville, Conn., assignor to H. D. Smith and Company.
93,952.—APPARATUS FOR REMOVING BENZINE FROM HYDROCARBONS.—H. J. Berg, Butler, Pa.
93,953.—DEVICE FOR SUPPORTING WAGON BEDS.—Norborne Berkeley, Aldie, Va.
93,954.—WASHING MACHINE. — George M. Bohlender, Peoria, Ill.
93,955.—TREADLE.—John B. Bolinger, Detroit, Mich.
93,956.—COMBINED HARROW, ROLLER, AND DRILL.—Samuel Bradbury, Dresden, Mo.
93,957.—ADZE.—Peter H. Bradley, Portland, Me. Antedated August 7, 1869.
93,958.—CORK-CUTTING MACHINE. — Edmund A. Brimson, New York city.
93,959.—HARROW.—Thomas Sands Brown and Thomas Archer Brown, Brooklyn, Cal.
93,960.—WINDOW-BEAD FASTENING. — George F. Brown, Winchendon, Mass.
93,961.—HEATER FOR KEROSENE LAMPS.—Willis L. Brown (assignor to himself and Samuel W. Bowen), Shelburne Falls, Mass.
93,962.—SEWING MACHINE.—Joshua H. Butterworth, Dover, N. J.
93,963.—WASHING MACHINE.—C. A. Calaway, Madison, Ohio.
93,964.—APPARATUS FOR TRANSMITTING POWER BY THE MEDIUM OF AIR.—Horace Call (assignor to himself and J. B. Rand) Concord, N. H.
93,965.—APPARATUS FOR WASHING ORES.—Wm. L. Carter, Marietta, Pa.
93,966.—MACHINE FOR MAKING POTTERY. — Andrew M. Cheeseman, Trenton, N. J.
93,967.—VELOCIPEDE.—A. Combs, Helena, Montana Territory.
93,968.—HORSE COLLAR AND HAMES.—Howard Connick, Albert Lea, Minn.
93,969.—SEEDING MACHINE.—Thomas M. Corbett (assignor to himself and John I. Herrick), Milwaukee, Wis.
93,970.—CLOTHES DRYER.—Darwin E. Crosby and Sarah E. Strickland, South Vineland, N. J.; said Sarah E. Strickland assigns her right to said Darwin E. Crosby.
93,971.—STOPPING MECHANISM FOR LOOMS.—G. K. Dearborn, Smithfield, assignor to himself and O. A. Tanner, North Providence, R. I.
93,972.—COOLING SOAP AND FORMING THE SAME INTO BARS.—Silas R. Divine, New York city. Antedated August 7, 1869.
93,973.—WAGON TIRE.—Jacob Dodder, Washington, Iowa.
93,974.—KNAPSACK ENGINE.—Joseph W. Douglas (assignor to W. B. Douglas), Middletown, Conn.
93,975.—RAILROAD CAR SPITTOON.—J. S. Du Bois, St. Louis, Mo.
93,976.—DEVICE FOR TIGHTENING WIRE FENCE.—Douglas Eaton, North Ridge, N. Y.
93,977.—GATE.—Stephen Elliott, Richmond, Ind.
93,978.—SPRING.—William Evans, Eureka, Wis.
93,979.—GATHERING ATTACHMENT FOR SEWING MACHINES.—Alfred Everiss, New York city.
93,980.—PROCESS OF PREPARING HOMEOPATHIC MEDICINES.—Bernhardt Fincke (assignor to F. Gustavus Fincke), Brooklyn, N. Y.
93,981.—CANT HOOK.—O. P. Frantz and E. Broad, St. Anthony, Minn.
93,982.—MEDICAL COMPOUND FOR TREATING THE ORGANS OF VOICE.—Francis Frisiani, New York city.
93,983.—RAILWAY CAR SPRING.—Perry G. Gardiner, New York city.
93,984.—RAILWAY CAR SPRING.—Perry G. Gardiner, New York city.
93,985.—GRAIN BINDER.—N. F. Gilman, Rochester, Minn.
93,986.—LAMP EXTINGUISHER.—Wm. Grayson and C. D. Hyndman, Odell, Ill.
93,987.—ADJUSTABLE CARRIAGE SEAT.—Wm. H. Gregg and Wm. Bowe, Wilmington, Del.
93,988.—MANUFACTURE OF RESIN AND SPIRITS OF TURPENTINE.—John F. Griffen, New York city.
93,989.—SEEDING MACHINE.—John D. Harrison, Middletown, Ohio.
93,990.—PUMP.—M. C. Hawkins, Edinborough, Pa.
93,991.—VELOCIPEDE.—James H. Haynes, Union county, Ark.
93,992.—OAR LOCK.—Henry Hempstead, Greenport, N. Y.
93,993.—ELECTRO-MAGNETIC SIGNAL APPARATUS.—George B. Hicks, Cleveland, Ohio.
93,994.—PLOW.—Leavitt Hunt, Weathersfield, Vt.
93,995.—SASH BALANCE.—S. W. Huntington, Augusta, Me.
93,996.—METALLIC WINDOW SHUTTER.—B. A. Jenkins, La Crosse, Wis.
93,997.—SHOVEL PLOW. — Gregory Jennings, West Cairo, Ohio.
93,998.—BOLT-THREADING MACHINE.—Wm. Johnson, Lambertville, N. J.
93,999.—CLOTHES DRYER.—Luther N. Johnson and Benton Silloway, Montpelier, Vt.
94,000.—QUADRANT HINGE.—Nathaniel Jones, Lockport, Ind.
94,001.—REVERSIBLE PLOW.—J. W. Jones (assignor to himself and S. H. Beckwith), Thomson, Ill.
94,002.—BUTTONHOLE AND BUCKLE.—L. A. Kettle, Philadelphia, Pa.
94,003.—REVOLVING FIRE-ARM.—Charles A. King, Springfield, Mass.
94,004.—WASHING MACHINE.—J. B. King, New York city.

94,005.—WASHING MACHINE.—Alexander King and Geo. H. King, Painesville, Ohio.
94,006.—CURTAIN FIXTURE.—J. W. King, New York city.
94,007.—DRIVING WELL TUBES.—D. R. Knight, Akron, Ohio.
94,008.—APPARATUS FOR CLARIFYING CANE JUICE BY MEANS OF SULPHUROUS ACID GAS.—Adonis Labauve, Convent, La.
94,009.—WOODEN TRUNK.—Jacob Lagowitz, Newark, N. J.
94,010.—SLEIGH BELL.—G. W. Lamb, Cobalt, Conn.
94,011.—FLOOR CATCH FOR TABLE LEGS.—J. M. Lemon, Polk City, Iowa.
94,012.—DEVICE FOR FOLDING LETTERS, ETC.—G. W. R. Lewin, Rochester, N. Y. Antedated Aug. 7, 1869.
94,013.—MACHINE FOR REMOVING GREEN CORN FROM THE COB.—T. S. Lewis, Portland, Me.
94,014.—MAGNETO-ELECTRIC MACHINE.—Dieudonne Francois Joseph Lontin and Eardley Louis Charles d'Ivernois, Paris, France. Patented in France Dec. 11, 1868.
94,015.—STEAM ENGINE.—J. R. Maxwell and Ezra Cope, Cincinnati, Ohio.
94,016.—SHOWCASE FOR COUNTERS.—Noah Mayo and Eben S. Morse, Bath, Me.
94,017.—UMBRELLA.—Thomas McCreary (assignor to himself G. M. Sullivan, and John McCreary), Matteawan, N. Y.
94,018.—SAIL HANK.—Wm. McKay, Newburyport, Mass.
94,019.—WOOD PAVEMENT.—Antoine R. McNair, New York city.
94,020.—SPRING BED BOTTOM.—Joseph Moore, Tarentum, Pa.
94,021.—MACHINE FOR HEADING BOLTS.—David G. Morris, Catasauqua, Pa.
94,022.—SAW TEETH.—Jonah Newton, New York city.
94,023.—CLOTHES DRYER.—Geo. Oldham, Westfield, N. Y.
94,024.—SLED.—S. H. Partridge, Peterborough, N. H.
94,025.—SPRING BED BOTTOM.—Edward Perry, Hopkinton, Mass.
94,026.—PORTABLE HEATING ATTACHMENT FOR STOVES.—J. S. Perry, Albany, N. Y.
94,027.—PUMP.—Charles Powell, Birmingham, England.
94,028.—SAW SHARPENER.—George Price, Peoria county, Ill.
94,029.—APPLICATION OF CARBONATED WATERS IN MEDICINE AND SURGERY.—A. D. Puffer, Somerville, Mass.
94,030.—FABRIC FOR THE MANUFACTURE OF COLLARS, CUFFS, etc.—Jas. Restein, Philadelphia, Pa. Antedated Aug. 9, 1869.
94,031.—LAMP LIGHTER.—John Rigby, Fort Howard, Wis.
94,032.—CORN-ROW MARKER.—John Roberts, Greenfield, Ind.
94,033.—BUTTER MACHINE.—Davenport Rogers, Mount Gilead, Ohio.
94,034.—WAGON REACH AND HOUND.—W. R. Santley, New London, Ohio.
94,035.—HAIR TRIGGER.—F. Schenck, San Antonio, Texas.
94,036.—HAIR TRIGGER.—F. Schenck, San Antonio, Texas.
94,037.—INSULATOR.—Franklin Scott, Brooklyn, N. Y.
94,038.—CANT HOOK.—Peter Shults, Rockwood, N. Y.
94,039.—VELOCIPEDE.—Xavier Simon, Akron, Ohio.
94,040.—STEAM CYLINDER OILER.—S. F. Stanton, Manchester, N. H., and Orville Ripley, Charlestown, Mass.
94,041.—PLOW.—D. A. Stubblefield and W. H. Luse, Yazoo county, Miss.
94,042.—CLIP FOR ATTACHING BUCKLES.—S. G. Sturges and W. E. Sturges, Newark, N. J.
94,043.—WAFFLE IRON.—Cornelius Swartwout (assignor to himself, Joseph Foxell, Thomas Jones, and Edward W. Millard), Troy N. Y.
94,044.—HARROW.—F. Y. Tavenner, J. W. Galbraith, and Alfred Smith, Sedalia, Mo.
94,045.—MACHINE FOR CHARGING GAS RETORTS.—N. O. J. Tisdale, New Orleans, La.
94,046.—SEWING MACHINE.—S. S. Turner (assignor to himself and Willard Corney), Westborough, Mass.
94,047.—BREECH-LOADING FIRE-ARM.—S. F. Van Choate, Boston, Mass.
94,048.—HORSE RAKE AND HAY SPREADER COMBINED.—H. C. Varnum, Hartford, Vt.
94,049.—BUGGY TOP.—J. S. Wayne, Quincy, Ill.
94,050.—CORN SHELLER.—Theophilus Weaver, Harrisburg, Pa.
94,051.—SASH STOP.—M. V. B. White, Ballston, N. Y.
94,052.—FANNING MILL AND GRAIN SEPARATOR.—Darius Wilcox, Charlton, Iowa.
94,053.—PRINTERS' GALLEY.—J. Wilson, Jr., New York, assignor to himself and William Quail, Williamsburgh, N. Y.
94,054.—HOE.—J. F. Wilson, Athens, Ga.
94,055.—VELOCIPEDE.—A. M. Allen, New York city.
94,056.—VELOCIPEDE.—A. M. Allen, New York city.
94,057.—VELOCIPEDE.—A. M. Allen, New York city.
94,058.—MECHANICAL VELOCIPEDE.—Arthur M. Allen, New York city.
94,059.—PIPE COUPLING.—Matthew Andrew, Melbourne, Australia.
94,060.—FOOT WARMER.—Dinsmore Austin, Sheldon, Vt. Antedated Aug. 17, 1869.
94,061.—MACHINE FOR SAWING PAVING BLOCKS.—W. W. Ballard, Elmira, N. Y.
94,062.—WOOD PAVEMENT.—W. W. Ballard, Elmira, N. Y., and B. B. Waddell, Memphis, Tenn.; Buren B. Waddell assigns his right to W. W. Ballard.
94,063.—MODE OF CUTTING BLOCKS FOR WOOD PAVEMENT.—Wm. W. Ballard, Elmira, N. Y., and B. B. Waddell, Memphis, Tenn.; B. B. Waddell assigns all his right to W. W. Ballard.
94,064.—MANUFACTURE OF PLATED METAL BRACELETS.—John Barclay, Attleborough, Mass.
94,065.—COMBINED SEEDING MACHINE AND CULTIVATOR.—Lorenzo Bartlett, Cardington, Ohio.
94,066.—WOOD PAVEMENT.—Albert Betteley, Boston, Mass.
94,067.—CULTIVATOR.—A. C. Brinser, Middletown, Pa.
94,068.—MECHANICAL MOVEMENT.—A. W. Browne, Brooklyn, N. Y., assignor to himself and the New York Toy Manufacturing Company.
94,069.—PIPE COUPLING.—J. R. Brown, New Haven, Conn.
94,070.—TRACE BUCKLE.—J. H. H. Buell, Oriskany, N. Y.
94,071.—KNITTING MACHINE.—Frank Burns, Upper Gilmanton, N. H.
94,072.—GRINDING MILL.—Nelson Burr, Batavia, Ill.
94,073.—MANUFACTURE OF SOAP.—W. T. Bush, Obion county, Tenn.
94,074.—WATER WHEEL.—Josiah Buzby, Crosswicks, N. J.
94,075.—BASKET.—W. H. Carpenter, New York city.
94,076.—HOG ELEVATOR.—A. J. Chambers and T. Jackson, New Washington, Ohio.
94,077.—CORN PLANTER.—J. Burchard Chapman, Morrison, Ill.
94,078.—VALVE FOR PUMPS.—James Clayton, Brooklyn, N. Y.
94,079.—COMPOSITION FOR GUMMING POSTAGE AND REVENUE STAMPS.—C. L. Coombs, Washington, D. C.
94,080.—COMPOSITION OF MATTER FOR VARIOUS USES IN THE ARTS.—C. L. Coombs, Washington, D. C.
94,081.—RAILROAD CONDUCTORS' TICKET BOX AND FARE DETECTOR.—Edwin Cowles, Cleveland, Ohio.
94,082.—CLOTHES WRINGER.—Philipp Cramer, Barrington, R. I.
94,083.—RAILWAY CAR BRAKE.—J. M. Crosby, Marathon, N. Y., assignor to himself, Wm. Ballard, and Frank Livingston.
94,084.—COMPOSITION FOR COVERING STEAM BOILERS, PIPES, AND OTHER ARTICLES.—W. B. Davis, Brooklyn, N. Y.
94,085.—DUPLEX WRENCH.—A. B. Davis (assignor to himself and W. C. Ewing), Philadelphia, Pa.
94,086.—STREET CAR.—Marinus De Graff, Chicago, Ill.
94,087.—COMBINED SUPPORTER.—Solon Dike (assignor to himself and J. A. Phillips), New York city.
94,088.—LABEL FASTENER.—C. R. Doane, Brooklyn, E. D., N. Y.
94,089.—LIFTING FLATS IN SELF-STRIPPING CARDING ENGINES.—Benjamin Dobson and Wm. Slater, Bolton, England.
94,090.—HAMES FASTENER.—A. M. Dorman, Philadelphia, Pa.
94,091.—STEAM-ENGINE GOVERNOR.—C. Duclos, New Harmony, Ind.
94,092.—WASH BOILER.—J. H. Elward, Palo, Ill.
94,093.—OIL CAN.—J. G. Evans, St. Louis, Mo.
94,094.—COAL SHOVEL.—M. G. Fagan, Troy, N. Y.
94,095.—MACHINE FOR MAKING HORSESHOE NAILS.—D. J. Farmer, Wheeling, West Va. Antedated Aug. 16, 1869.
94,096.—BUREAU DRAWER.—Maurice Fitzgibbons, New York city.
94,097.—STONE-DRILLING MACHINE.—J. P. Frizell, Keokuk Iowa.
94,098.—INTERFERING PAD.—George W. Fry, Uxbridge, Mass.
94,099.—APPARATUS FOR FURLING SAILS.—E. G. Gaillic, Eastport, Me.
94,100.—CAR SPRING.—P. G. Gardiner, New York city.
94,101.—RAILWAY CAR SPRING.—P. G. Gardiner, New York city.
94,102.—SNOW PLOW FOR RAILWAYS.—C. L. Garfield, Albany, N. Y.
94,103.—GAS BURNER.—Robert Gill (assignor to E. P. Gleason), New York city.
94,104.—STEAM ENGINE.—Levi Griswold, Portland, and Geo. Caul, York, Wis.
94,105.—HAND SEED SOWER.—Geo. Hall, Morgantown, West Va.
94,106.—CULTIVATOR.—Richard Haney and James S. Estes, Peoria, Ill.
94,107.—PIPE WRENCH.—Michael Hastings, Brooklyn, N. Y.
94,108.—MUSICAL INSTRUMENT.—George Herrick, Waverly, N. Y.
94,109.—SAFETY DOOR FOR BUILDINGS.—C. Hesse, Champaign, Ill.
94,110.—BALING PRESS.—Philip Higdon, Lewisport, Ky.
94,111.—WATER WHEEL.—Otis J. Hodge, North Adams, Mass.
94,112.—SEWING MACHINE.—Geo. W. Hoffman, Hick's Mills Ill.
94,113.—MANUFACTURE OF INKSTANDS.—T. S. Hudson, East Cambridge, Mass.
94,114.—MALT KILN AND MALT HOUSE.—W. W. Hughes, Philadelphia, Pa.
94,115.—VENTILATOR.—M. T. Hynes (assignor to himself and P. J. Whelton), Boston, Mass.
94,116.—CONSTRUCTION OF HOUSES.—H. M. Irwin, Charlotte, N. C.
94,117.—MACHINE FOR PUNCHING AND SHEARING METAL.—W. H. Ivens and W. E. Brooke, Trenton, N. J.
94,118.—HAND RAKE.—Daniel Johnston, Sulphur Springs, Ohio.
94,119.—TOY PISTOL.—John P. Kirk, Brooklyn, E. D., N. Y. Antedated Aug. 14, 1869.
94,120.—PHOTOGRAPHIC CAMERA STAND.—George S. Knapp, Winona, Minn.
94,121.—DIAPHRAGM FOR WASH BOILERS.—J. R. Manny, (assignor to himself and A. C. Selleck), Chicago, Ill.
94,122.—MACHINE FOR MAKING BOLT HEADS.—M. D. Marcy, Worcester, Mass.
94,123.—VEGETABLE CUTTER.—Solomon Metzger, Newberry, Pa.
94,124.—FENCE POST.—W. A. Middleton, Harrisburg, Pa.
94,125.—GARDEN IMPLEMENT.—Henry Miller, Roadside, Va.
94,126.—WAGON REACH.—J. H. Moffett, Reading, Mich.
94,127.—CARD HOLDER.—W. R. Oatley, (assignor to himself, E. H. Scranton, and L. G. Wetmore,) Rochester, N. Y.
94,128.—MACHINE FOR MAKING SOD FENCE.—Jairus Osgood, Blue Hill, Me.
94,129.—WASH BOILER.—Nathaniel Parks, Mohawk, N. Y.
94,130.—MACHINE FOR TURNING OVALS.—Paul Pryibil, New York city.
94,131.—MANUFACTURE OF PAPER.—J. B. Read, Tuscaloosa, Ala. Antedated, August 17, 1869.
94,132.—WATER METER.—T. D. Read and L. M. Ellis, Aberdeen, Ind.
94,133.—GANG PLOW.—F. F. Reynolds, Bethany, Ga.
94,134.—BOOT AND SHOE SEWING MACHINE.—E. P. Richardson, Lawrence, Mass.
94,135.—KNITTING MACHINE.—S. H. Roper, Boston, Mass.
94,136.—MACHINE FOR MAKING SLATE PENCILS.—D. R. Satterlee, New Haven, Conn.
94,137.—ALARM LOCK.—Nicholas Seubert, Syracuse, N. Y.
94,138.—SMOKE HOUSE.—L. W. Shaeffer, Union township, Ohio.
94,139.—WATER WHEEL.—S. Sherwood, Independence, Iowa.
94,140.—MORTISING AND TENONING MACHINE.—W. H. Sible, Harrisburg, Pa.
94,141.—HARVESTER.—Wm. H. H. Sisum, Cherry Valley, N. Y.
94,142.—HORSE HAY FORK.—Simon Slack, Dowagiac, Mich., assignor to himself and E. G. Salisbury.
94,143.—ROTARY STEAM VESSEL.—G. T. Snyder, Wilmington, Del., assignor to himself and G. W. Airey, Baltimore, Md.
94,144.—GRAIN SEPARATOR.—William Spencer, Winslow, Ind.
94,145.—COMBINED STRAW CUTTER, CORN SHELLER, AND GRINDING MILL.—Welcome Sprague, Farnham, N. Y.
94,146.—JOINT FOR CEMENT PIPES.—Melvin Stevens (assignor to himself and Nathan Stevens,) Brooklyn, N. Y.
94,147.—TWEER.—B. K. Taylor, Harrisburg, Pa.
94,148.—CLOCK ESCAPEMENT.—Michael Tromly (assignor to himself and W. L. Hasbrouck), Cincinnati, Ohio.
94,149.—TOP PLATE OF COOKING STOVES.—Charles Truesdale (assignor to himself and William Resor and Company,) Cincinnati, Ohio.
94,150.—SUPPORT FOR ELLIPTIC SPRING.—John J. Unsworth, Washington, D. C.
94,151.—REFRIGERATOR.—J. C. Vanpelt, Cincinnati, Ohio.
94,152.—INJECTOR FOR STEAM GENERATOR.—Elijah Ware, Southford, Conn.
94,153.—HARROW.—Eli G. Warner, Union township, Ohio.
94,154.—SCRAPER.—William Watson, Danville, Ill.
94,155.—WHISTLING TOY.—Charles Weber, West Meriden, Conn.
94,156.—PERMUTATION LOCK.—Jacob Weimer, Mount Vernon, N. Y.
94,157.—GENERATING GAS FOR MOTIVE POWER, FOR EXTINGUISHING FIRES, AND FOR OTHER PURPOSES.—C. G. Wheeler, Chicago, Ill.
94,158.—HAT POUNCING MACHINE.—S. S. Wheeler, Danbury, Conn., assignor to Edward A. Nichols, Yonkers, N. Y.
94,159.—TURNING TOOL.—J. P. Whipple, Woonsocket, R. I.
94,160.—MILK COOLER.—G. A. Whitcomb, Morrison, Ill.
94,161.—WRENCH.—W. A. Wilson, Savannah, Mo.
94,162.—WATER WHEEL.—A. N. Wolf, Mill Creek township, and Joel Haag, Bernville, Pa.
94,163.—MACHINE FOR POLISHING SPOKES.—J. V. Woolsey, Sandusky, Ohio.
94,164.—SPOKE TENONING MACHINE.—J. V. Woolsey, Sandusky, Ohio.
94,165.—WASH BOILER.—E. M. Wright, Castile, N. Y., assigns one half to Gardner Herrick, Albion, Mich.
94,166.—CLOTH TENTERING AND DRYING MACHINE.—Andre Avery, Worcester, Mass.
94,167.—HARVESTER.—Alzirus Brown, Worcester, Mass.
94,168.—VEHICLE FOR CARRYING MAIL.—D. D. Foley, Washington, D. C.
94,169.—PROPAGATING BOX FOR PLANTS.—Clark Jillson, Worcester, Mass.

REISSUES.

87,617.—WASHING MACHINE.—Dated March 9, 1869; reissue 3,613.—T. Bailey and V. W. Blanchard, Bridport, Vt.
31,348.—SKATE.—Dated Feb. 5, 1861; reissue 3,614.—J. F. Calhoun, Wolcottville, Conn., assignee, by mesne assignment of P. J. Clark.
78,872.—SUSPENDERS.—Dated June 16, 1868; reissue, 3,615.—Alexander Wimbish Harris, New York city.
91,657.—SUBSOIL PLOW.—Dated June 22, 1869; reissue 3,616.—James W. Murfee, Havana, Ala.
12,723.—MACHINE FOR PUNCHING METAL.—Dated April 17, 1855; extended seven years; reissue 3,617.—Charles Parker, Meriden, Conn., assignee of George Fowler and the administrators of the estate of De Grasse Fowler, deceased, viz., Maltby and Sophronia Fowler.
44,561.—FEED-WATER HEATER AND FILTERER.—Dated October 4, 1864; reissue 2,159; dated January 23, 1866; reissue 3,618.—Edwin R. Stillwell, Dayton, Ohio.
89,211.—MACHINE FOR HEADING BOLTS.—Dated April 20, 1869; reissue 3,619.—C. H. Emerson and John F. Emerson, New York city.
63,300.—PROCESS OF PRESERVING WOOD AND TIMBER.—Dated March 26, 1867; reissue 3,620.—Daniel R. Prindle, East Bethany, N. Y.
23,267.—WATER WHEEL.—Dated March 15, 1859; reissue 918, dated Feb. 28, 1860; reissue 3,621; P. H. Roots (assignor to himself and F. M. Roots), Connersville, Ind.

DESIGN.

3,638.—SLEIGH.—James Nelson and Harmon G. Ellsworth, Lockport, N. Y.

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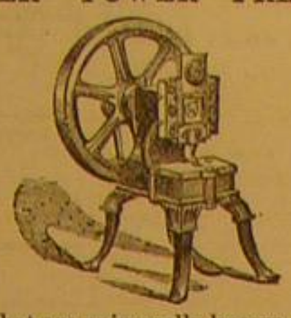

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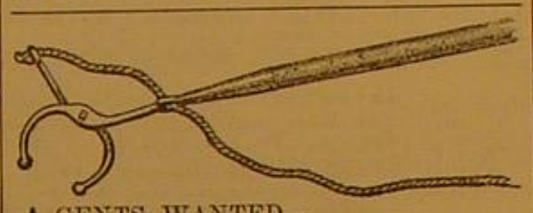

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Vol. XXI.—No. 12. (NEW SERIES.) NEW YORK, SEPTEMBER 18, 1869. $3 per Annum (IN ADVANCE.)

Improvement in Glassware Presses.

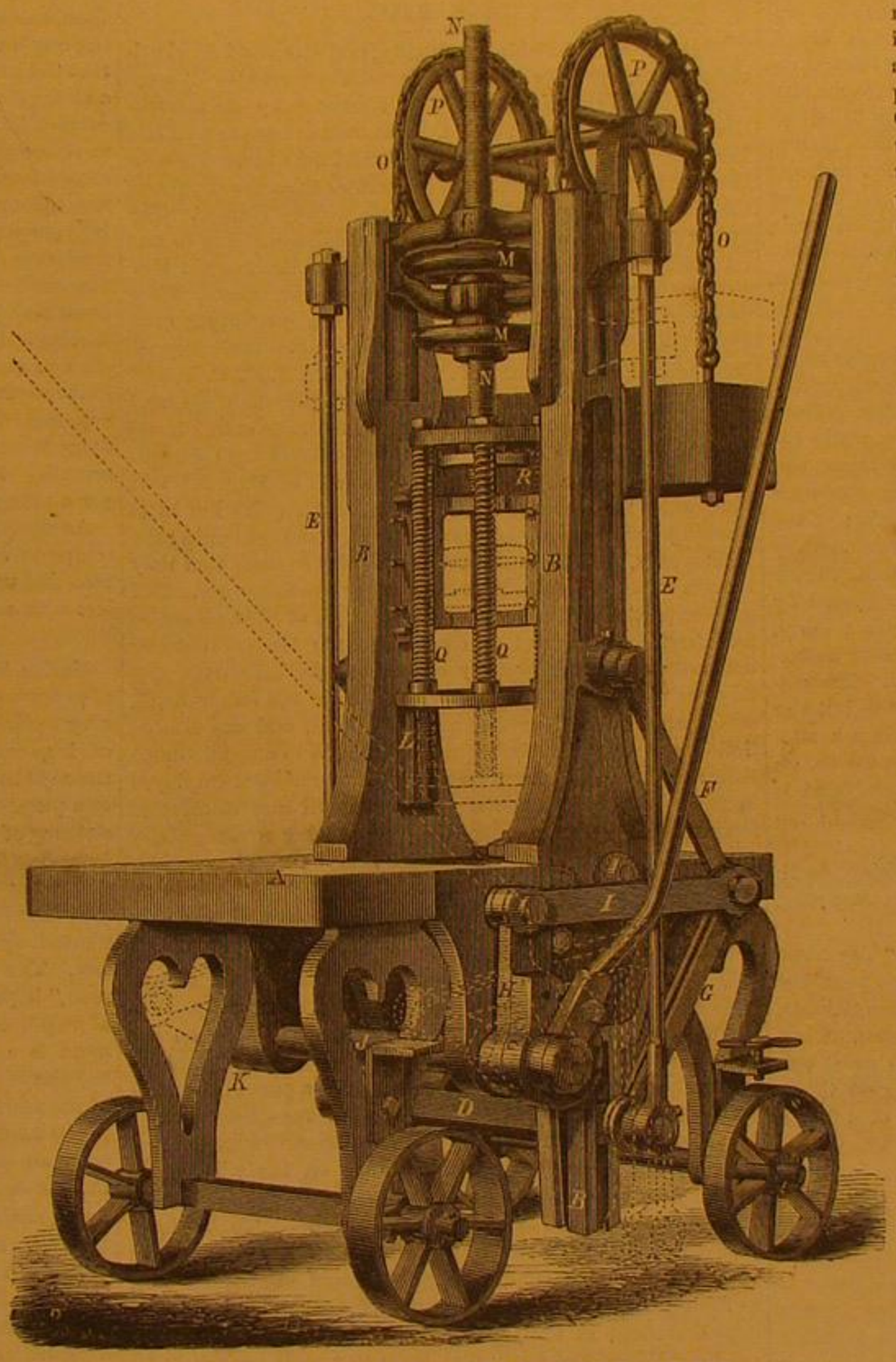
In the construction of glassware presses it is desirable that the movement of the platen or presser toward the bed shall begin with a rapid, and terminate with a slow but powerful movement; and it is also desirable that this movement shall be effected by means which will operate with so little friction and side thrust that the press will work sensitively, or so that the operator can determine, by feeling, the resistance offered just when the pressing should be discontinued; if the pressing is continued beyond the proper point the mold is injured and the ware spoiled.

The press shown in the accompanying engraving has a peculiar combination of devices by which the moving parts of the machine operate to give the platen or presser a motion which changes from a rapid one at first to a slow but powerful movement at last, at the same time leaving the press delicate and sensitive in its indication, through the lever, of the resistance offered to a continued pressing movement.

In the engraving the parts are shown in the position which they occupy previous to making a stroke. The dotted lines show the position they occupy when the presser is brought to its lowest position in making an impression.

To the bed, A, are attached two uprights, B, in the top and bottom ends of which are formed guide ways, in which the ends of the crosshead, C, and crossbar, D, can be made to reciprocate simultaneously, being connected by the links, E. Toggles, made by links, F and G, on each side of the machine, are operated by the movement of the rocker lever, H, connected to the toggles by the links, I. Each link, F, of each toggle is pivoted to a fixed pivot in each upright, B; and the lower link, G, of each toggle is connected to the crossbar, D. The rocker lever, H, is fixed upon the rocker shaft, J, which carries, at the other end, a rocker lever, K, one of the links, I, being coupled to the rocker lever, H, the other to a rocker lever, K', said links being connected one to each toggle.

On the inner surfaces of the uprights, B, are guide ways, L, which guide the presser in its reciprocating motion, the presser being connected to the crosshead, C, by the screw hand wheels M, and screw, N, by which the platen can be adjusted toward and from the bed to suit various hights of molds. To counterbalance the gravitation of the moving parts, and thereby increase the sensitiveness of the press, chains, O, with a weight at one end, pass over the wheels, P, and are attached to the crosshead, C. It will be obvious that the first part of the movement of the lever toward the operator, will rapidly move the platen by straightening the toggles; and that the movement of the platen, proportionately to the movement of the lever, will grow less and less, and more and more powerful in effect as the toggles approach a straight line. The toggles thrust directly down upon the crossbar, which pulls through the links, E, in a direct line with the crosshead, C, thus avoiding all side thrust and strains on the crossheads and platen, so that the most delicate ware can be made on this press, as well as the heaviest. The friction, as in weighing apparatus, is reduced to a minimum by the system of pivots and centers. The springs for holding the mold in position, shown at Q, are of good length, four in number, and adjustable by the screw hand wheel, R.



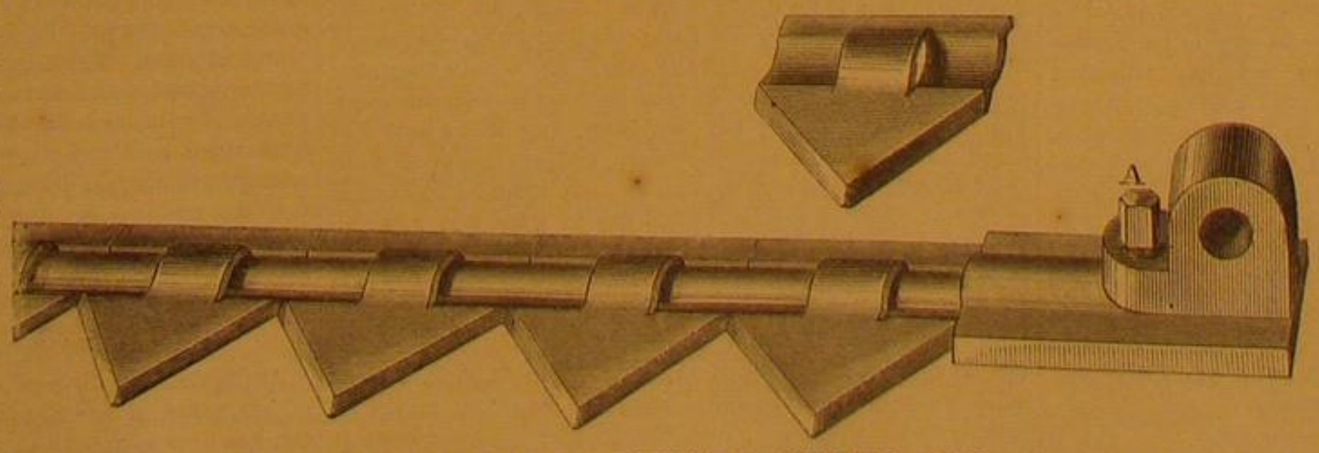
HAWES & HERSEY'S GLASSWARE PRESS.

This press was patented June 8, 1869. The presses are manufactured by the inventors and patentees, Messrs. Hawes & Hersey, well-known machinists and press builders, of South Boston, Mass., and are pronounced by those who have seen or used them, to be the best machine of the kind ever produced. For rights to build, or for presses, they can be addressed as above.

Harvester Cutter Bar.

Our inventors are latterly turning out a series of unusually practical and valuable improvements. The one we now present to our readers, is a device that will save much time, trouble, and expense to farmers, and the convenience of which must be obvious upon even a cursory inspection. The cutter bar is made of the patent cold rolled iron of Jones and Laughlins, noticed at length on page 50, Vol. XX, SCIENTIFIC AMERICAN, and is made so that its cross section is of the form made by the intersection of two equal circles. It has not a rivet hole in its entire length—a fact which will be significant enough to farmers, when they recall the points of fracture in the finger bars they have broken in their practice.

Upon this bar are slipped the cutters, made in the form shown in detail at the upper part of the engraving. The terminal knife being fastened by a screw, shoulder, or any other suitable means, and the cutter bar being thrust in and held by the set screw, A, all are held firmly, yet any one can be reached and removed with the utmost facility, when occasion requires. Should a cutter bar break, all the knives can be removed, another bar inserted, and the knives replaced in five minutes. But as the shape of the bar and the absence of rivets give great strength with lightness, it is evident that not only will there be less liability to breakage, but the reciprocation of the bar will absorb less power than the old form of bar. The easy removal of the knives is also a great advantage in grinding, obviating any necessity for special appliances for this object. They can be perfectly and easily ground on the ordinary grindstone



ADJUSTABLE HARVESTER CUTTER BAR.

The inventor informs us that although his patent bears date June 8, 1869, he has already received orders for twenty thousand of these bars. Communications should be addressed to G. L. Du Laney Mechanicsburg, Pa.

CHINA AND THE CHINESE.

It is now conceded by shrewd observers of current events, that the Chinese element is destined to become in the future an important part of our population, and to exercise a great influence on the destiny of this continent. It is not therefore to be wondered at that the periodicals of the time should find the discussion of anything which pertains to this remarkable people acceptable to their readers. So little have China and Chinese customs been understood, that now when the public mind is awakened to the importance of better information in regard to that ancient empire, it is surprised at the very erroneous ideas it has hitherto entertained. This surprise arises not only from the differences between our customs and those of the Chinese, but also from the fact that the Chinese have made very much greater advances in civilization than has been generally supposed by other civilized nations.

Some of these facts have been put in a very acceptable dress by a writer in the *Atlantic Monthly*, for September, from which we extract a portion:

China is the type of permanence in the world. To say that it is older than any other existing nation, is saying very little. Herodotus, who has been called the Father of history, traveled in Egypt about 450 B.C. He studied its monuments, bearing the names of kings who were as distant from his time as he is from ours—monuments which even then belonged to a gray antiquity. But the kings who erected those monuments were posterior to the founders of the Chinese Empire. Porcelain vessels, with Chinese mottoes on them, have been found in those ancient tombs, in shape, material, and appearance precisely like those which are made in China to-day; and Roselini believes them to have been imported from China by kings cotemporary with Moses, or before him. This nation and its institutions have outlasted everything. The ancient Bactrian and Assyrian kingdoms, the Persian monarchy, Greece and Rome, have all risen, flourished, and fallen—and China continues still the same. The dynasty has been occasionally changed; but the laws, customs, institutions, all that makes national life, have continued.

The authentic history of China commences some three thousand years before Christ, and a thousand years in this history is like a century in that of any other people. The oral language of China has continued the same that it is now for thirty centuries. The great wall bounding the Empire on the north, which is twelve hundred and forty miles long, and twenty feet high, with towers every few hundred yards—which crosses mountain ridges, descends into valleys, and is carried over rivers on arches—was built two hundred years before Christ, probably to repel those fierce tribes who, after ineffectual attempts to conquer China, traveled westward till they appeared on the borders of Europe five hundred years later, and, under the name of Huns, assisted in the downfall of the Roman Empire.

All China was intersected with canals at a period when none existed in Europe. The great canal, like the great wall, is unrivaled by any similar existing work. It is twice the length of the Erie Canal, is from two hundred to a thousand feet wide, and has enormous banks built of solid granite along a great part of its course. One of the important mechanical inventions of modern Europe is the Artesian well. That sunk at Grenoble was long supposed to be the deepest in the world, going down eighteen hundred feet. One at St. Louis in the United States, has since been drilled to a depth, as has recently been stated, of more than four thousand feet. But in China these wells are found in tens of thousands, sunk at very remote periods, to obtain salt water.

The method used used by the Chinese from immemorial time has recently been adopted instead of our own, as being

much more simple and economical. The Chinese have been long acquainted with the circulation of the blood; they inoculated for small pox in the tenth century; and about the same time they invented printing. Their bronze money was made as early as 1,100 B. C., and its form has not been changed since the beginning of the Christian era. The mariner's compass, gunpowder, and the art of printing were made known to Europe through stories told by missionaries returning from Asia. These missionaries, coasting the shores of the Celestial Empire in Chinese junks, saw a little box containing a magnetized needle, called Ting-nan-Tchen, or "needle which points to the south." They also noticed terrible machines used by the armies in China, called Ho-pao, or fire-guns, into which was put an inflammable powder, which produced a noise like thunder, and projected stones and pieces of iron with irresistible force.

The first aspect of China produces that impression on the mind which we call the grotesque. This is merely because the customs of this singular nation are so opposite to our own. They seem morally, no less than physically our antipodes. Their habits are as opposite to ours as the direction of their bodies. We stand feet to feet in everything. In boxing the compass they say "westnorth" instead of northwest," "eastsouth" instead of southeast, and their compass-needle points south instead of north. Their soldiers wear quilted petticoats, satin boots, and bead necklaces, carry umbrellas and ans, and go to a night attack with lanterns in their hands, being more afraid of the dark than of exposing themselves to the enemy. The people are very fond of fireworks, but prefer to have them in the daytime. Ladies ride in wheelbarrows, and cows are driven in carriages. While in Europe the feet are put in the stocks, in China the stocks are hung round the neck. In China the family name comes first, and the personal name afterward. Instead of saying Benjamin Franklin or Walter Scott, they would say Franklin Benjamin, Scott Walter. Thus the Chinese name of Confucius, Kung-fu-tsee, the Holy Master Kung; Kung is the family name.

In the recent wars with the English, the mandarins or soldiers would sometimes run away, and then commit suicide to avoid punishment. In getting on a horse, the Chinese mount on the right side. Their old men fly kites, while the little boys look on. The left hand is the seat of honor, and to keep on your hat is a sign of respect. Visiting cards are painted red, and are four feet long. In the opinion of the Chinese, the seat of the understanding is the stomach. They have villages which contain a million of inhabitants. Their boats are drawn by men, but their carriages are moved by sails. A married woman while young and pretty is a slave, but when she becomes old and withered is the most powerful, respected, and beloved person in the family. The emperor is regarded with the most profound reverence, but the empress mother is a greater person than he. When a man furnishes his house, instead of laying stress, as we do, on rosewood pianos and carved mahogany, his first ambition is for a handsome camphor-wood coffin, which he keeps in the best place in his room.

The interest of money is thirty-six per cent, which, to be sure, we also give in hard times to stave off a stoppage, while with them it is the legal rate.

We once heard a bad dinner described thus: "The meat was cold, the wine was hot, and everything was sour but the vinegar." This would not so much displease the Chinese, who carefully warm their wine, while we ice ours. They understand good living, however, very well, are great epicures, and somewhat gourmands, for, after dining on thirty dishes, they will sometimes eat a duck by way of a finish. They toss their meat into their mouths to a tune, every man keeping time with his chop-sticks, while we, on the contrary, make anything but harmony with the clatter of our knives and forks. A Chinaman will not drink a drop of milk, but he will devour bird's nest, snails, and the fins of sharks, with a great relish. Our mourning color is black, and theirs is white; they mourn for their parents three years, we a much shorter time. The principal room in their houses is called "the hall of ancestors," the pictures or tablets of whom, set up against the wall, are worshiped by them; we, on the other hand, are very apt to send our grandfather's portrait to the garret.

Such are a few of the external differences between their customs and ours. But the most essential peculiarity of the Chinese is the high value which they attribute to knowledge, and the distinctions and rewards which they bestow on scholarship. All the civil offices in the Empire are given as rewards of literary merit. The government, indeed, is called a complete despotism, and the emporer is said to have absolute authority. He is not bound by any written constitution indeed; but the public opinion of the land holds him, nevertheless, to a strict responsibility. He, no less than his people, is bound by a law higher than that of any private will—the authority of custom. In China, more than anywhere else, "what is gray with age becomes religion." The authority of the emperor is simply authority to govern according to the ancient usages of the country, and whenever these are persistently violated, a revolution takes places and the dynasty is changed. But a revolution in China changes nothing but the person of the monarch; the unwritten constitution of old usages remains in full force.

Setting Mineral Teeth.

Surgeon Duchesne, of Paris, has invented a method of fixing mineral teeth to the dental piece. Each tooth is furnished with a hollow of a size exceeding that of the orifice, by which orifice the rubber in its plastic state enters into the tooth, assuming inside the internal configuration, and, as it were, the shape of a nail-head of a pyramidal form, or of the form of a flattened cone, and the rubber being properly vulcanized, the tooth becomes firmly attached to the dental piece. The hole being obtained by placing on the rear side of the mold of the tooth, which is molded of materials well known to tooth manufacturers, the base of a piece of wood, or of any other suitable material, cut into the shape of a cone, and which can be consumed or melted at a lesser degree of heat than that required for the baking of the tooth; this piece of wood or other material being destroyed during the process of biscuiting, there remains in the center of the tooth a hollow, corresponding in size and shape with the material which has been burnt out. The principle of strength which is claimed for this tooth consists in the fact, that the rubber, a portion of the dental piece to which it is to be attached, entering into the tooth itself, the tooth actually forms part and parcel, so to speak, of the dental piece; and the principle of the invention consists in the hollow in the center of the tooth of a larger size than the orifice by which the rubber, or other plastic material is introduced, of whatever form this hollow may be, whether produced by the consuming, melting, or annihilating of any animal, vegetable, or mineral matter, that can be annihilated by a less heat than that required for the baking of the tooth.

THE MANUFACTURE OF PAPER---PAPER MADE FROM RAGS.

Rags are a marketable commodity, and command fixed prices according to their quality. As with all articles of commerce, these prices are governed in a measure by the mercantile law of supply and demand. As foreign rags are sold at a less price than the American article, and the consumption in the United States is considerably greater than the supply of the latter, large quantities are imported from Europe. The larger proportion of foreign rags that find their way to our Atlantic cities, are exported from Bremen, Hamburgh, Rostock, Ancona, Messina, Leghorn, Palermo, and Trieste. They arrive in our ports in closely packed bales, containing each about four hundred pounds, which, according to their respective qualities are branded S. P. F. F., S. P. F., F. F., F. X., and F. B. There are many varieties, even in these divisions, and their qualities afford very clear indications of the state of comfort and cleanliness of the particular localities from whence they were originally gathered. The rags of England and the United States are generally clean, and require but little washing and cleansing before they are ground into pulp; the Italian rags, on the contrary, are originally so dirty that they require to be washed in lime before they are fit for use. The greater portion of the rags from the north of Europe are so dark in their color and so coarse in their texture that one naturally wonders how they could have formed part of any tidy woman's garments; while those, on the other hand, which are collected in England, Scotland, and the United States, appear evidently to have belonged to a people much better clad. Having thus alluded to the material employed in paper making, the reader's attention will now be directed to the process of its manufacture. The visitor to a regularly organized paper mill is first conducted to

THE RAG ROOM.

The initial process of sorting the rags is conducted in a long room, in which from twenty to thirty women are employed in sorting, dusting, and cutting them. Each woman stands at a frame or table, the top of which is covered with a net-work of wire, through which to admit the dust; on her left is a quantity of rags conveniently placed, on her right is a box divided into three compartments. On a part of the table an upright knife is fixed for cutting the rags into suitable lengths. As it is the business of the woman to sort and cut the rags, she spreads a certain quantity on the wire frame, and as she shakes them a great deal of the dirt passes through the interstices of the wire into a box beneath. Those pieces that require to be cut she draws across the blade of the knife, by which it is instantly divided. All seams are thrown out, as the sewing thread, unless thoroughly ground, would produce filaments in the paper. These are afterwards picked out by children, and again find their way to the woman's table. The work of sorting and cutting rags is performed with great rapidity. When cut, sorted, and dusted, the rags are weighed into bags of a hundred pounds each and conveyed to

THE BOILING AND WASHING ROOM.

Here they are placed into large square chests or vats, in which steam is admitted from below and boiled with lime for a few hours. From the boiling room they are conducted in suitable vessels to an upper room in the mill, where they are emptied into troughs or cisterns, several of which are ranged in a row; these troughs and the machinery within them, are technically called engines, and are used for washing the rags. The troughs are usually ten feet long, four and a half feet broad, and two and a half feet deep, and are made of wood lined with lead. In each trough an iron cylinder 22½ inches in diameter and 26 inches wide is fitted; pure water is conveyed by means of a pipe or tube into the trough a few inches from the top, and another tube connects with the lower part for carrying off the soiled water. The cylinder being set in motion by means of steam or water power, about a hundred weight of rags are dumped in, as before mentioned, and as much water introduced as will raise the whole to within an inch or two of the brim. Into the cylinder is fixed a number of knives at given distances apart, projecting a little more than an inch from its axis; and beneath the roller is a plate in which is also attached a number of knives. When the cylinder commences its revolutions, of which it is made to make about 160 per minute, the rags are carried with great rapidity through the knives; and as the cylinder is depressed or elevated, the rags are bruised or cut as may be required. Above the cylinder is a cover made of a wire frame communicating with the pipe which admits the pure water. When, therefore, the whole mass is in agitation, the rags, after passing through the knives of the cylinder and plate are carried up an inclined plane in the trough and the foul water is carried off through the waste pipe below; in this way the rags are cut bruised, and washed.

After the above operation is continued for a sufficient time, the water is let off and the cleansed mass is removed to a press for the purpose of driving out the greater part of the water. They then undergo the process of

BLEACHING.

This process reduces all descriptions of rags to a uniform whiteness, and requires to be so conducted as not to injure the quality of the fabric. On being removed from the press the rags are placed in a receiver, or chamber made of wood, from which the external air is carefully excluded. Into this chamber are conveyed pipes communicating with a retort, in which a chemical chlorine is formed by the application of heat to a due proportion of manganese, common salt, and sulphuric acid. This part of the process is completed in a few hours. The rags are now white, but they have an intolerable smell. To remove this, and to preserve them from being injured through the effects of the bleaching, they undergo a second process of washing and bruising which entirely purifies them. From the washing engine the rags are conveyed to the beating engine, which is constructed similar to the other except that the knives on the cylinder and plate are closer together, and the former revolves with greater rapidity. Having been ground for several hours in this machine, the rags assume the beautiful appearance of pulp technically called "stuff." It should here be remarked that all paper manufacturers do not use the same materials for bleaching the rags. In several large paper mills a substitute for manganese is used. This is a mixture of phosphates of lime and soda ash which seems to answer the required purpose, and is much less expensive. The same may be said of the whole prescribed formulæ in paper making. So rapid are the strides of scientific progress, that ere a useful practical theory is put in full operation, new improvements are suggested, which, in many cases, are made to supersede it. Hence, no description of this extensive branch of art will fully represent every manufacturer's method. The essential features, however, of the processes employed in paper making, are similar in all paper mills.

As what is technically called "machine-made paper" is a comparatively late invention, it may properly be expected that this treatise should preface any remarks upon the subject with a brief description of

HAND MADE PAPER.

Until a little more than half a century since all descriptions of paper were made by hand. The process though simple is very beautiful, and evinces a remarkable degree of mechanical ingenuity. We have already described the various stages the rags have gone through up to the time they are reduced to a pulp. From this pulp or "stuff," which is about the consistency of pure milk, and resembling it in appearance, paper is made. The stuff is first poured into a vat, at the bottom of which is a copper vessel made to fit exactly within it, for the purpose of keeping the stuff warm. This warmth is communicated by means of heat supplied by a steam pipe from below. The workman forming the sheet, who is called a "vatman," is provided with two molds. These are slight frames of wood, covered with a fine wire cloth. Fitting to each mold is a dekle or movable raised edging which determines the size of the sheet. The vatman, putting the dekle on one of the molds, dips it vertically into the stuff, and bringing it to the surface horizontally, covered with pulp—which, to preserve an equal consistency is kept in a state of agitation in the vat—and shakes it gently so that all parts of the wire frame shall be equally covered with it. This operation requires a great deal of nicety, both in determining the required thickness of the sheet and in producing it of a uniform thickness throughout. The vatman then pushes the mold with the incipient sheet to his fellow workman, who is called a "coucher," and carefully taking off the dekle applies it to the second mold, and proceeds as before. The coucher, who receives the first mold, having a pile of porous pieces of flannel by his side (called "felt"), turns the mold carefully over upon one of these, and upon which the sheet remains, having been detached from the mold; he then places a felt on the sheet and is ready to turn over another from the second mold. Thus the vatman and the coucher proceed, only two persons being required at each vat, the one molding a sheet of paper and the other placing it upon the felt, until a certain quantity is made, when the pile of felts is subjected to the action of a powerful press. The sheets, after this pressure is completed, have acquired sufficient consistency to enable them to be again pressed by themselves. They are next parted, then dried; next sized in a mucilage, to give them greater body and strength, and again dried and pressed, and finally counted into quires and reams. Any number of vats, each requiring the services of two men, may be used at the same time. This is a matter, however, usually regulated by the capacity of the mill and the means of the manufacturer.

MACHINE MADE PAPER.

As previously intimated, the progress of mechanical science of late years, in paper making as in many other branches of art, has been so rapid in its onward march that manual labor is in a great measure superseded by machinery. In paper making, machinery is not only a saving of manual labor, but economizes time and money, and largely multiplies the facilities for its manufacture, as will be made plainly manifest to the most indifferent observer.

The process of converting a thin pulp into paper by machinery is a rapid though complicated operation. In the

whole range of labor-saving machinery there is perhaps no series of contrivances which so forcibly address themselves to the senses ; and yet, with all its intricate and wonderful operations, there is nothing mysterious in it, as the spectator can see and comprehend its workings from the beginning to the end. At one extremity of the machine is a large chest which is kept full of pulp, and through which a wooden cylinder with fan-shaped projections attached, is kept revolving to keep the fibers of rags, which resemble pure snow flakes, perpetually moving, and consequently equally suspended in the the water which contains them. At the bottom of the chest is a cock through which a continuous stream of pulp flows into a vat placed below it, which is always kept filled to a certain hight. This pulp flows through a narrow wire sieve, situated in the upper part of the vat, and is also kept in motion to make the sifting process the more complete. Having passed through the sieve the pulp flows through a pipe in the vat still onward to a ledge, over which it falls in a regular stream, like a sheet of water over a smooth dam ; here it is caught upon a plane which presents an uninterrupted surface of five or six feet, upon which it is evenly spread. This plane is constanly moving onwards with a gradual pace, and has also a shaking motion from side to side. This plane is composed of an endless web of the finest wire very closely woven together. The pulp does not flow over the sides of the plane because of a strap on each side, which is kept moving and passing upon its edges, and which regulates the width of the paper. After passing the wheels where these straps terminate, the paper is sufficiently formed not to require any further boundary to define its size. The pulp at this stage has ceased to be a fluid though the paper is still tender and wet. When it quits the plane of wire the paper passes over a large cylinder covered with felt, upon another plane also covered with felt, which moves onward the same as the wire plane. This felt surface is also endless, being united at the extremities like a towel upon rollers. It now travels up an inclined plane of felt, which gradually absorbs its moisture, when it is seized between two rollers which powerfully squeeze it. From thence it travels up another plane of felt and through a second pair of pressing rollers. The paper up to this point is quite formed but it is fragile and still damp ; from these it is received upon a small roller, and is guided by this over the polished surface of a large heated cylinder. The soft tissue now begins to smoke and the paper commences to harden. From this cylinder or drum, it is received upon a second, considerably larger and much hotter than the first ; as it rolls over the polished surface of the drum all the roughness of its appearance when in the cloth region gradually vanishes. At length having passed over a third cylinder, still hotter than the second, and having been subjected to the pressure of a blanket which confines it on one side, while the cylinder smoothes it on the other, it is caught upon the last cylinder, which passes it over to the reel, upon which it is wound in a finished state but in an endless roll. It has now to be cut into required lengths so as to form the size of the sheet. This is done in a supplementary machine which receives it off of the reel, and by means of a circular knife it is cut into the requisite lengths. The paper is counted into quires and reams, folded double, and subjected to a certain pressure, so that it may pack close for marketable purposes.

From the commencement of the process, when the pulp first flows into the wire web until the paper into which it is formed is received upon the reel, a little less than two minutes is occupied. The web of wire travels at a rate which produces twenty-five superficial feet of paper per minute.

In a machine the thickness of the paper is regulated by the quantity of stuff which is allowed to flow out of the chest ; and all that is required to render the thickness invariable is an invariable speed in the motion of the machine. If the web of wire travels at a rate that will form twenty-five feet of paper per minute, and the chest discharges five gallons of pulp in the same period, there can be no change in the thickness of the sheet ; but let the machine move at greater speed, say at the rate of twenty-five per minute, while the discharges are but five gallons, and the paper will be thinner by one fifth. Again, let the pace of the wire plane be unaltered, and the chest discharge ten instead of five gallons per minute, and the sheet will be just double the thickness.

In conclusion it should be remarked that the process of converting rags into pulp is the same with machine-made as with hand-made paper, except that in the former it is conducted on a more extensive scale. A hundred years ago rags were made into pulp, first by washing them by hand and then by placing them in close vessels until they became half rotten, and after the fiber was nearly destroyed they were reduced to pulp either by hammering in a mortar or by a cylinder grinding against the sides of a circular wooden bowl. These operations were slow, expensive, and very destructive to material ; and yet, crude as the method was, it existed for centuries, and so continued up to the period when science stepped in to enlighten mankind with its manifold wonders.

Portable Boilers.

At the Steam Users' Association monthly meeting, held at Manchester—Mr. W. Fairbairn, President, in the chair—Mr. L. E. Fletcher, chief engineer, said that the increasing number of boilers used for steam crane and other similar purposes, renders it important that any dangerous defects to which these boilers are liable should be generally known. The explosion of these boilers has become by no means unfrequent, and as they are now constantly used in the erection of public buildings, and sometimes in close proximity to crowded thoroughfares, the subject becomes of increasing importance. The boiler in question was of the internally-fired vertical class, cylindrical in the external casing, as well as in the internal fire-box, and domed on the top, while the flames from the fire-box pass off to the chimney through a single central uptake tube, which formed a most important tie between the crown of the fire-box and that of the external casing. Boilers of this type are very simple in construction, and well calculated when new to resist a high pressure, so that they are very generally adopted. The dimensions of the one under consideration were : Height, 8 ft. 9 in. ; diameter, 3 ft. 6 in. in the external shell, and 2 ft. 9 in. in the fire-box ; while the thickness of the plates was $\frac{5}{16}$th in., and the load on the safety-valve, per square inch, 70 lb. The defect to which it is now wished to call attention, was a deep groove or furrow running entirely round the inner casing of the fire-box at the bottom of the water space, and eating into the metal to a depth varying from $\frac{1}{8}$ to $\frac{3}{16}$th in., so that more than half the strength of the plate was gone. This is not a peculiar case ; others very similar havd been met with, and especial danger arises from the fact that these grooves are very difficult to detect. They take place so low in the water space as to be very nearly, if not entirely, concealed by the blocking ring at the bottom, while the only opportunity of examining them is through one or two small sight holes cut through the outer casing. It is frequently supposed that because boilers are small therefore they are safe, whereas the fact of their being small makes them dangerous. Small boilers cannot be inspected as larger ones can, since they do not admit of access for a man, and, therefore, they are to a greater or less extent apt to be worked on at a risk. The internal examination, and thus the safety, of portable boilers is a question which hitherto has not received that consideration which it deserves, but the subject should no longer be neglected. It is well worthy of the attention of engineers to endeavor to construct such portable boilers as are too small to admit of a man's getting inside, so that they may be taken to pieces for examination ; and it becomes imperative either that arrangements should be made for doing this, or that these boilers should not be allowed to work on for more than three or five years without being cut open for examination, whatever the inconvenience might be. No doubt if the attention of engineers were directed to this subject, inventive talent would soon construct boilers that could without much difficulty be taken to pieces so as to be examined internally, and thus their safety ensured.

PULEX IRRITANS IN HARNESS.

What is a "Pulex Irritans?" This formidable name, dear reader, is the scientific cognomen of that formidable little monster, the flea. These minute pests have been made to do, what by nature they are ill calculated for, namely, to administer to the amusement of mankind, showing an amount of docility truly surprising when brought under the subjection of skilled trainers. Novices they are generally adroit enough to elude. The following humorous description of the performances of a troupe of these little comedians we copy from the "Naturalist's Note Book :"

"If any inquiring reader wishes to know whether that little tormentor, scientifically known as "Pulex irritans," and vulgarly as the flea, has ever been found of any use in the economy of nature's realm, we are happy to inform him that we can answer his question in the affirmative. It must not be imagined that we are going to discuss the question whether it is desirable that the human form divine should be subject to sundry little aggravating bites, which are liable to make one's angry passions rise, or whether the ordinary avocations of fleaish life are at all beneficial to humanity at large. Our object is to place him before our readers as we have seen him, in a new light, earning an honest livelihood (*mirabile dictu !*) by the sweat of his brow, and affording a subsistence to the individual whose philanthropic ingenuity helped him to such a desirable end.

"'From information received' (to use police parlance) we went to an exhibition opened by Mr. Kitchingman, in order to view the performances of his stud of trained fleas, or, as worded in his announcements, 'of trained apterous insects, the only specimens of the articulata in the world ever taught to perform.' These apterous laborers were harnessed by means of an extremely fine hair or fiber of silk, which was tied round their bodies, having the two ends rising perpendicularly above their backs and fastened to a split in a tiny straw, which formed the pole of the carriage they were engaged in drawing. We must confess that at first we entered the room with some feelings of alarm, suggested by the thought that some of the menagerie might escape, but this was soon dissipated at the sight of their burdens, which at once set our minds at rest.

"The performances were highly interesting and considerably varied. One flea was engaged in a swing, his motion being caused by his kicking violently against one side of a well in which he was placed, which exertion bumped him against the other side and made him indignantly jump away again, so that the unfortunate creature was in a perpetual state of kicking. Another hauled up a little ivory bucket from a well, while a third drew a ship along a tight rope, walking upside down. A fourth was occupied in turning a cardboard cylinder after the manner of a treadmill, but two others, still more unhappy, were occupied in a compulsory see-saw worked by each in turn giving a vigorous spring into the air, thus bringing the other at the opposite end of the balance to the ground. The largest, and consequently, we presume, the laziest, declined to jump at all, but remained sitting quietly down, leaving his comrade miserably suspended from the beam, and frantically clutching at the air in the vain attempt to reach the ground. A military pulex was engaged in firing off a miniature cannon, but on a former occasion the shock was too much for his nervous system, so that when we were present he was unable to perform. The exhibitor kindly gave us a good deal of information about his collection which was very interesting. The fleas are generally imported from Russia and Belgium as being larger and more docile than the English ones, and are set to work immediately, the training beginning with a starvation of two days. At first they are very refractory, persisting in progressing by a series of violent jumps instead of a proper jog trot ; but after a week or so they sober down and draw their burdens steadily unless stirred up to violent exertion, when they will gallop vigorously for a few inches, but sit down to rest and regain their breath directly afterwards. After they once learn to walk steadily, we are told, it is difficult to persuade them to leap again. At night all the performers are unharnessed and fed on the back of the employer's hand, after which repast they repose in a box enveloped in cotton wool. If at night any performer does not feed heartily, and with a good appetite, his progress is proportionately languid and slow the next day; but when any member of the establishment declines to eat for three or four days, his end is expected in a short time. About a hundred others are usually kept in stock and training, as they are comparatively short lived, three or four months being supposed to be the allotted period of their days. Perhaps confinement and hard labor affect their spirits. The workman engaged in drawing up the bucket had, however, reached the hoary age of nine months, and his demise therefore will not be unexpected. The immense muscular power possessed by these creatures is here fully demonstrated. No doubt many of our readers have experienced the difficulty of holding a wild pulex for a minute or two, before consigning it to perdition. The flea Hercules draws a model of a ship estimated to be five hundred times his own weight in a very easy manner. It seems that the English fleas are the most stubborn and difficult to train, but when once properly subdued they work better and last longer than the others ; but the Englishman we saw was anything but steady, tugging and straining at his collar in a frantic manner.

"One of the most interesting features of the exhibition is the beautiful form of the models employed for the work. They are carved in ivory and exquisitely finished, and, of course, of the minutest size possible, being adapted to the fleas in a most ingenious manner, and manufactured by the exhibitor himself. The delicacy of touch and sight attainable after practice is surprising, as each performer is harnessed without the aid of a glass, merely being taken between the operator's finger and thumb. Mr. Kitchingman told us also that he knows every individual performer by sight, so that he has no difficulty in selecting each member of his troupe for his own work."

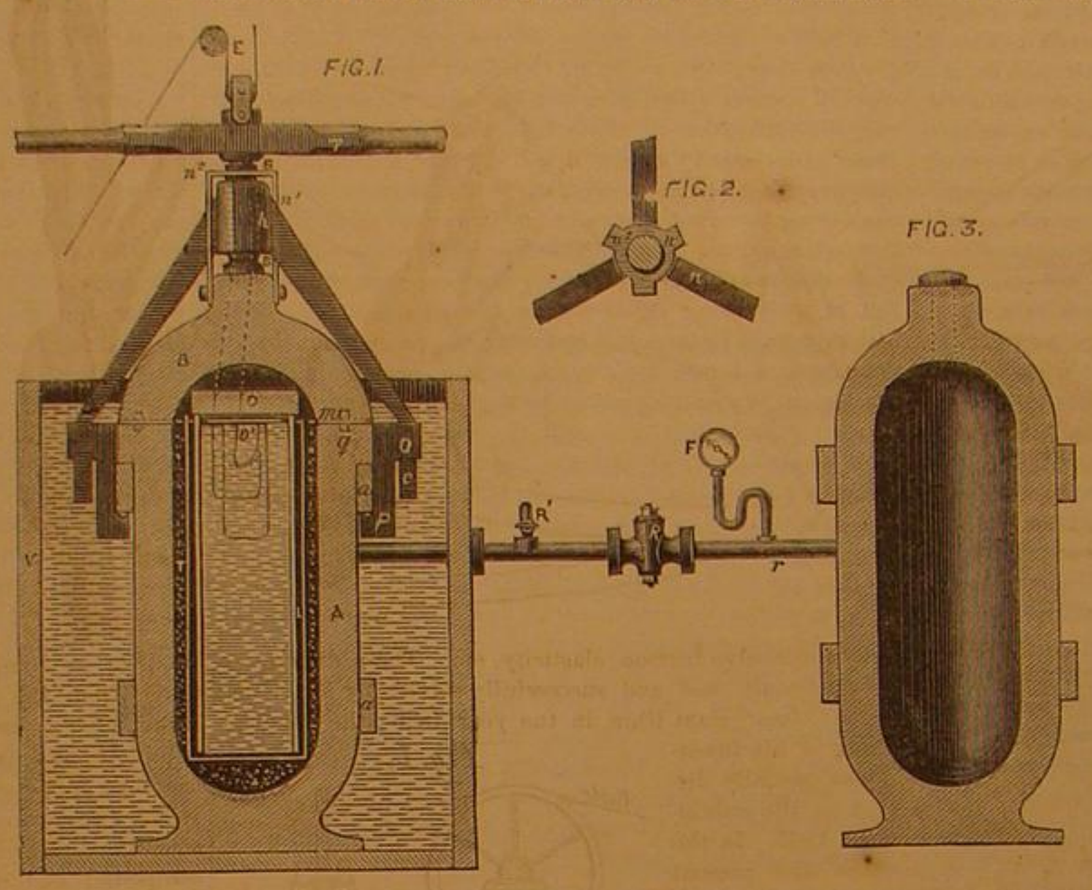
Revival of Interest in Sorghum.

The quantity of cane planted this year, says the *Sorgo Journal*, and the interest manifested in sorghum, is greater than in any year since 1866. The value of sorghum as a farm crop is beginning to be appreciated, and those now engaged in the business are devoting more attention to its cultivation, and are providing better facilities for its manufacture than ever before. This is wise, and all the enterprise which may be devoted to the crop will be well rewarded. Sweets of all kinds are and must be high for the present, and probably for many years. Last year's crop of sorghum is about exhausted. New Orleans and tropical molasses are scarce, and sugars are almost at famine prices. This state of things is, of course, aggravated by the disturbances in Cuba, and by the fact that Louisiana has not produced all the sugar and molasses that could be consumed, as many predicted she would. But there is an underlying cause of high prices greater in importance and greater in permanence than these accidents of the time, and which would be felt even if peace prevailed in Cuba, and a half million hogsheads of sugar were being made in Louisiana. We refer to the natural increase in the consumption of sugar, and to the growing disproportion between the demand and the supply. This will prevent sugar and molasses from declining to the old prices, until some new and much more productive source of sugar shall be developed. We make this remark to remove a notion which prevails, that, if Cuba were restored to peace, and Louisiana to her former productive capacity, sugar and molasses would be furnished at their old prices, and then sorghum would be no longer profitable. Reasoning thus, many have refrained from engaging in sorghum, and many who are in the business, regarding it as a temporary or short-lived enterprise, fail to make adequate and permanent preparation for the business. This is a mistaken policy, we think, and we advise those who are making preparation for work to consider well, and see if they are not warranted in regarding sorghum as a business likely to be permanently profitable, and worthy of a permanent and a substantial outfit in buildings and apparatus. But all the probabilities are that Cuba will not for many years, if ever again, produce her former supply of sugar, and that Louisiana will not for five, and, perhaps, ten years, produce as much sugar as she did before the war. So that the producer of sorghum may calculate upon a good substantial and a continuous profit from the business, and also upon the chances amounting almost to a certainty that the profits will be for some years, at least, extraordinary. Under these circumstances the "revival of interest in sorghum," must, we think, become a permanent and a growing revival.

In a recently published paper on the gases given off by fruit it is stated that various kinds of fruit after having been plucked from the trees—for instance, apples, cherries, gooseberries, and currants—begin to absorb oxygen and give off carbonic acid.

Casting Metals, Glass, etc.

Letters patent have been taken out in France for improvements in casting metals, glass, and other materials. We give an illustrated description of the apparatus employed. An air-tight vessel is formed of a hollow cylindrical vessel of cast iron, closed at its lower end, and strengthened on the exterior by rings of wrought iron shrunk upon it. The vessel is closed air-tight at its upper end by a hemispherical cover, between which and a flange around the upper edge of the vessel is placed a washer of soft metal; the lid when closed is pressed firmly down upon the washer by a screw working through a head or nut which is held down to the vessel by three descending arms, formed at their lower ends with lugs to hook on to other lugs which pass below the flange on the top of the vessel. When the head or nut is thus held the lid can be forced down by turning the screw which works through the nut. In case where it is desirable to apply the heat to the material during the time it is solidifying, as, for example, when casting ingots of steel, the mold into which the steel is to be cast is surrounded with a casting of thin metal, and placed within the air-tight vessel. Between the thin metal case and the sides of the vessel, pieces of charcoal are roughly broken up, and are so placed that air may penetrate readily through the charcoal; when the melted metal is poured into the mold the charcoal is thereby brought to a red heat and ignited, and by this means the metal is kept heated. As soon as the metal has been poured into the mold, a thin plate is placed upon the top of the metal in fusion, and a thick plate of fire-clay is placed over the top of the mold; the lid of the outer vessel is then put on, and the joint is made air tight by forcing it down by a screw, as above described. Compressed air is afterwards admitted into the vessel from a suitable reservoir; the communication between the reservoir and vessel can then be closed by a cock, so that the pressure in the vessel may be increased by the expansion of the air as it becomes heated.



APPARATUS FOR CASTING METALS, GLASS, Etc.

Fig. 1 of our illustration shows a vertical section of an apparatus constructed as described, the apparatus is more especially suitable for making castings of steel, but similar means may be employed when making castings of glass or other fluid substances.

A is a strong vessel of cast iron, strenghtened exteriorly with wrought-iron rings, *a*, shrunk upon it; B, a lid for closing the vessel air tight; S, the screw for pressing down the lid or cover on top of the vessel, A; the screw works through the nut, *n*, which, when the lid is to be closed, is held down to the vessel, A, by three arms formed at their lower ends with lugs, *c*, which are passed under other lugs, *o*, the stems, P, of which are fixed to the upper strengthening ring, *a*, of the vessel, A.

The screw and nut are connected to the top of the lid, B, by three other arms *n*1, descending from a ring, *n*2, through which the screw passes freely. The construction of these parts is clearly seen in the cross section shown at Fig. 2. At the top of the screw is carried a pulley, over which is passed a cord, E, by which the screw and with it the lid, B, can be raised or lowered when the lid is disconnected from the vessel. *q*, *q* are steady pins to keep the lid concentric with the top of the vessel, A, and *m*, is a soft-metal washer for making the joint between the vessel, A, and lid, B, air tight. In the interior of the vessel, A, is placed an iron ingot mold, L, into which the melted metal is to be pored; the lower end of the mold is closed by an iron bottom, as shown, and the top of the mold is covered over with a slab of fire tile, marked D, the ingot mold is surrounded by a casing, T, of thin sheet iron, and between this casing and the sides of the vessel, A, is placed charcoal broken into small pieces so that the air may pass freely amongst it. At Fig. 3 is represented a reservoir of compressed air communicating with the vessel, A, by a pipe, *r*, on to which is fitted a pressure gage, F, to indicate the pressure of air in the reservoir. The passage of air through the pipe, *r*, from the reservoir to the vessel, A, is controlled by a cock, R, the pipe, *r*, also carries a tap, R1, by opening which the pressure of air may be reduced when desired.

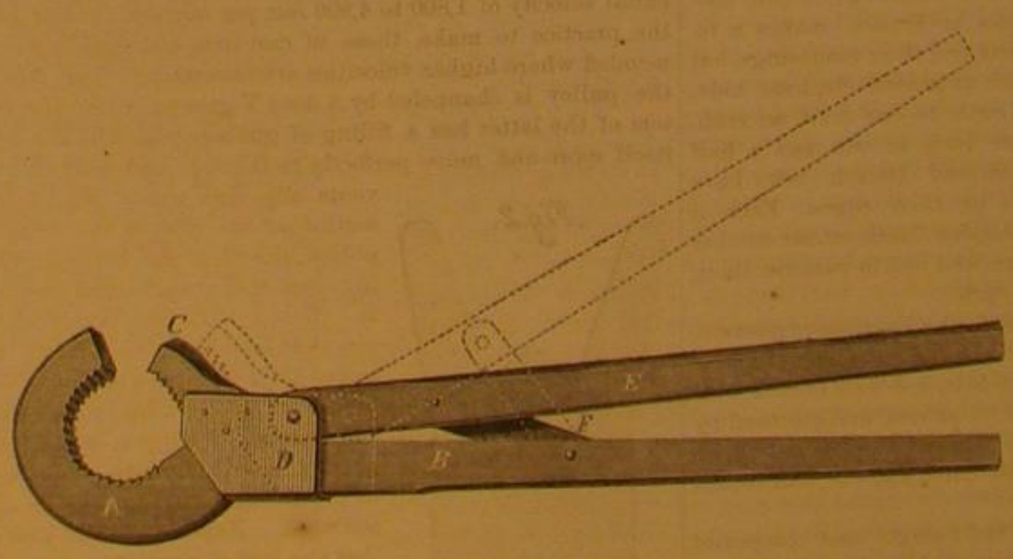
The apparatus is used in the following manner: Supposing the air reservoir to be filled with air at a pressure of about 10 atmospheres and that the melted steel is ready to be run into the ingot mold, the metal is poured into the ingot mold, L, the small disk of sheet metal, D1 is placed on the top of the fluid metal, and the whole is covered over with the disk of fire tile, D, as shown in the illustration, the fire tile having been previously heated to a white heat.

As the ingot mold becomes heated by the metal poured into it the heat is radiated from it across the small air space between the mold and the thin metal case by which it is surrounded, heats this casing to a red heat, and ignites the charcoal by which it is surrounded. The lid, B, is closed and fixed securely on the top of the apparatus, the lower end of the screw being forced down on the circular washer, *u*, on the top of the lid, B, by turning the screw of the lever arms, T1, upon it; the apparatus being closed, the tap, R, is opened, the compressed air passes into the apparatus, so making the pressure in the vessel, A, equal to the pressure in the air reservoir, the air becoming quickly heated, in the vessel, A, the pressure rises, and if the tap, R, is then closed, the pressure in the vessel, A, will rise above that in the air reservoir.

It will thus be seen that the pressure in the vessel, A, can readily be regulated by means of the taps in the pipe, *r*. We must here remark that the quantity of air which passes from the air reservoir into the vessel, A, is relatively very small, as the vessel, A, is almost entirely filled with the ingot mold, the casing, and the charcoal with which it is surrounded. This is very advantageous for economizing the compressed air employed, but more especially for concentrating the heat in a small space, so that the metal in the ingot mold may cool slowly and as regularly as posible, the exterior of the vessel, A, is surrounded by water contained in a bath or vessel, V, so as to keep it cool, as shown by our illustration. Steel thus cast into molds and subjected to pressure, is under the most favorable conditions for solidifying into a homogeneous mass, for as regards pressure it is compressed with a force which is considerable, as a pressure of ten atmospheres corresponds to a column of melted metal of about forty-five feet high; if this is compared with the hight of the head or get of metal usually employed by founders it will be seen how greatly superior is the process of casting above described to that usually employed. A pressure of ten atmospheres has been taken as an example, but there is nothing to prevent a pressure of twenty thirty or forty atmospheres being employed, as this may be done without danger. By the process above described a dense and homogeneous ingot is obtained, as the metal is not only subject to pressure while in a fluid state, but also as it passes through the pasty into the solid state. By the combined use of a concentrated heat and great pressure a highly malleable steel is obtained, and also a steel which when tempered becomes extremely hard, these being the two most valuable qualities in steel.

Improvement in Pipe Tongs.

This is an implement which is of great importance in gas fitting and plumbing, and presents decided advantages over the old style of pipe tongs. By its use the pipe may be more firmly grasped with less liability to injury, while it is equally convenient in use. In the engraving, A, is a curved jaw comprising about, or a little less than three fourths of a circle,



CRAIN'S PATENT PIPE TONGS.

and is forged with the handle, B, in one continuous piece. C is also a curved jaw about, or a little less than one fourth of a circle in extent, and is riveted to a bent plate, D, passing over the back of B. The other handle, E, is pivoted to D, and the two handles are connected by a link, F, so that when the handle E, is opened to the position shown by the dotted outline, the jaw, C, is withdrawn to the position shown by its dotted outline. This allows the pipe to enter between the jaws.

When the handles are pressed together, the jaw, C, approaches the other with great force through the action of the toggle formed by the handle, E, and the link, F; but as the pipe is grasped on all sides there is no danger of crushing it. The jaws are toothed internally in the usual manner, and for the same purpose. Patented, through the Scientific American Patent Agency, Aug. 3, 1869, by R. Crain of Shaffer Farm Dennison Post Office, Pa., who may be addressed.

SOMETHING NEW IN MECHANICS.

Under this head the *Independent Democrat*, of Concord, N. H., gives us a long description of what the editor supposes to be a new way of transmitting power, specially useful in cities as a substitute for steam, the invention of Horace Call, of that city.

By means of water wheels and pumps, air is to be compressed at the river bank and conducted in pipes to the city shops. Here the air discharges into the bottom of a tank, and bubbles up like a boiling caldron. Within the tank is a bucketed wheel, so arranged that the buckets will receive the ascending current of air, the force of which will turn the wheel and drive the machinery of the shop.

"The philosophy of the power," says the *Democrat*, "is simple. The air displaces the water in an upward current, equal to the weight of water down. It is so simple that it is a wonder that it has never been applied before.

"The possibilities of this invention afford a wide field for speculation, and one which we will not enter upon to-day. When we consider that it probably costs $50,000 a year to operate the stationary engines in this city, while a river with 10,000-horse power runs through it, unused, the magnitude of an invention which proposes to make it available at a comparatively small expense, is one which challenges the attention of mechanics and scientific persons."

There appears to us nothing in the above invention which warrants the great expectations expressed by our New Hampshire cotemporary. The practice of driving machinery by compressed air is very old. Ordinarily it is wanting in economy as compared with the direct employment of water or steam. But in inaccessible locations, in mines, and tunnels, it is used to advantage, serving for ventilation as well as power. In the Hoosac and Mont Cenis tunnels the drilling machines are driven by air, which is compressed by water power and carried long distances in pipes to the drills.

The only novelty in Mr. Call's improvement lies in his tank and air wheel; but this form of air engine can hardly be as effective as the ordinary machines. The resistance of the wheel revolving in the water, and the friction of the rising air will about equal, we should think, the friction of a well-constructed piston engine.

The Ponsard Process of Smelting Iron Ore.

This is a French improvement, if indeed it shall prove to be in practice a real improvement. The chief feature of the Ponsard process, is that the ore is pulverized and mixed with pure coal or carbon, and then placed into tubular crucibles, heated from the outside. By thus protecting the ore from the direct action of the fuel employed for heating the crucibles, inferior combustible matter can be used and a certain economy thereby effected. By an arrangement of the furnace, gray or white iron, or even steel, can be produced at will. The furnaces can easily be converted into puddling furnaces into which the metal can enter at one side and run out at the other, prepared for being submitted to the rolling mill.

Suit for a Million.

Andrew Whiteley, who for a long time has been contending with the Commissioner of Patents for certain reissues, has finally entered suit against that official. In his declaration he sets forth that, in various patent cases in which he was assignee of Gage, Weeks, Haines, and others, for improvements in harvesters, etc., he obtained certain orders of Judge Fisher, of the Supreme Court of the District of Columbia, directing the Commissioner of Patents to take certain evidence as to novelty, to reissue certain patents, and to antedate others; that, in consequence of these proceedings, he has been compelled to lose time, opportunities of making money, and to employ counsel, by reason of which he is a large loser. He therefore brings suit, laying his damages at one million dollars.

If Mr. Whiteley should succeed in getting judgment for the amount of damages claimed, we imagine that it might go hard with Commissioner Fisher to raise the funds.

Carvalho's Painting of the Grand Canyon of the Colorado River.

Mr. S. N. Carvalho, patentee of a very excellent steam super-treating device and an artist of considerable merit, gave a private exhibition of a new painting of his, on Friday evening, September 3d, at his studio, 765 Broadway. The subject is a view of the Grand Canyon of the Colorado River, and is of interest from the fact that the sketches were taken by Mr. Carvalho on the spot and while attached to the Fremont expedition as photographic artist. The stern and impressive grandeur of its everlasting rocks made such an impression on Mr. Carvalho that he took sketches of them

from various points of view with great trouble and at much personal risk.

The picture represents the canyon at the head of Diamond Creek, where the vast rocky walls rise abruptly to the hight of from 3,000 to 6,000 feet. At the bottom of this gloomy and terrible abyss flows a stream of dark water, flecked here and there with foam. In the background is a line of lofty bluffs, many of them crowned with masses of rock of enormous size and fantastic shapes, in which domes, towers, spires, and minarets are faintly outlined.

REAR-HORSES.

General Engelmann, of Illinois, has found by experience, that the best way to get rid of the grasshoppers in a vineyard is to raise rear-horses there, which are also known as devil's horses, *alias* praying nuns, *alias* intelligence bugs, *alias* devil's riding-horses, but the correct English name of which is "camel cricket."

Fig. 1 gives a very good view of the sexes of this insect, *b* representing the male, which is of a brown color, and *a* the female, which is of a green color. The female has such short wings that she is incapable of flight; but the male flies as readily and as strongly as an ordinary grasshopper. The General's mode of colonizing this insect in his vineyard, is to collect the masses of eggs in the dead of the year and place them upon his grape vines. Fig. 2 will enable the reader to recognize these singular egg masses whenever he may happen to meet with them. Persons are very generally ignorant of their real nature, and on the principle that "everything that is unknown must be something hateful and destructive," are apt to cut them off and throw them into the fire. They should, under no circumstances, be destroyed. As a general rule camel crickets are only found in the central and southern parts of Missouri, in the southern part of Illinois, and in other southerly regions. But Mr. D. B. Wier is domesticating them at Lacon, on the Illinois river; and on one occasion one of their egg masses was found as far north as Lee county, Northern Illinois. We are inclined to believe that, with a little care and attention they may be acclimated at points further north than these.—*American Entomologist.*

Fig. 1.

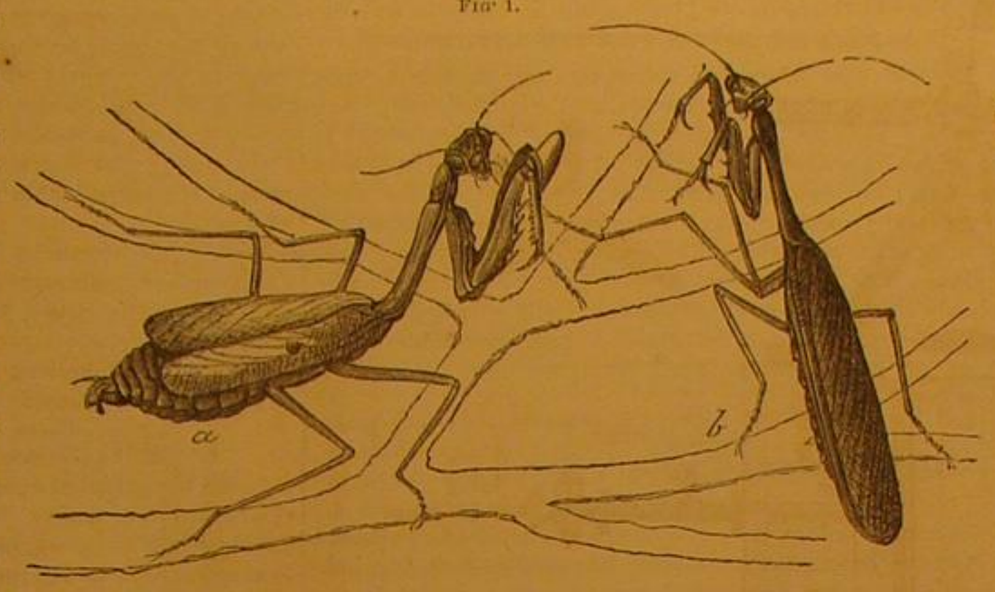


Fig. 2.

TRANSMISSION OF POWER.

BY WILLIAM S. AUCHINCLOSS, HONORARY COMMISSIONER TO THE PARIS EXPOSITION 1867.

LEATHER BELTING.

An examination of the different leather departments, and the varieties of belting in actual use, reveal a tendency on the part of manufacturers to improve the quality of wide belts by securing 2-inch strips along their edges. Specimens of this character are exhibited by Messrs. Webb & Son, Stowmarket, England; Mr. William Ruland, of Bonn, Prussia; H. Lemaistre & Co., Brussels, Belgium; Placide Peltereau, 32 Rue d'Hauteville, Paris; Poullain Brothers, 99 Rue de Flandre, Paris; and others of less note. The material forming these strips is (with a single exception) leather of the same quality as the belt. The methods of attachment are variable, as laces, threads, rivets, eyelets, and brass screws, The English use the threads, Prussians the laces, and the French all the varieties enumerated. Mr. P. Peltereau, proprietor of one of the largest houses in France, makes a remarkable display, not only of belts and their mountings, but of different kinds of leather; such as tanned elephant hide, varying in thickness from one fourth to one half an inch, and hippopotamus hide, from one inch to one and a half inches in thickness. His 8-inch and 10-inch belts have leather facings two inches wide on their edges. Each of these facings is attached by two leather laces, whose stitches have three fourths of an inch span, and run in parallel lines, separated by one and one fourth inch.

The "inextensible belt," for which, at a previous exposition, he received a gold medal, has steel instead of leather edging strips. These strips, for a 10-inch belt, are two inches wide by one sixty-fourth of an inch in thickness, and attached by two riveted rows of copper tacks. These tacks are one eighth of an inch in diameter, and placed three and one half inches between centers.

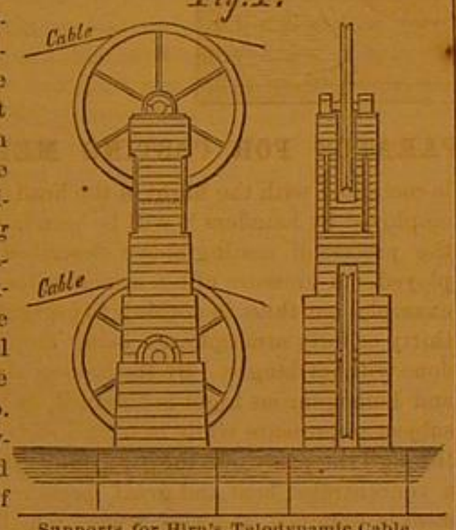
Messrs. Poullain Brothers join their single, and compound their double belts with headless one eighth of an inch brass screws. This is accomplished with a very ingenious machine, of which there are several types in the French department. It carries a coil of plain brass wire, which, while being fed to the work, passes through a die of twenty-eight threads to the inch. The screw thus formed enters the belt at a point closely clamped by a foot-lever, and, having passed through, is cut off. Finally, the belt being placed on a surface plate, the points of all the screws are slightly riveted. The most compact and expeditious of these machines is the invention of Mr. Cabourg, 74 Rue St. Honoré, Paris.

Mr. E. Scellos, of 74 Boulevard du Prince Eugène, exhibits what he terms a "homogeneous belt," for 150-horse power. This belt is nineteen and one half inches wide by three fourths of an inch in thickness. It is composed of 104 leather strips three fourths of an inch in width, laid longitudinally with reference to the belt, and laced transversely; the distance between laces is one and one fourth inch, and diameter of lace equals three sixteenths of an inch. The advantage of edge-bound wide belts, where frequent shipping is an essential, we think will be readily conceded; and to what extent they can supplant double belts, is a subject worthy of experimental inquiry. The use of very wide belts is seldom resorted to in the machinery department. One of the stationaries has two central ribbed pulley rims bolted to the arms of its fly wheel; on these run four belts six inches in width; another has two 12-inch edged belts, and so on—the inclination was always to increase the number rather than the width of the belts.

TRANSMISSION OF POWER TO GREAT DISTANCES.

For the transmission of power to great distances, leather and rubber belts are rendered useless by their extreme elasticity, and the expensive character of their intermediate supports; while shafting with bevel gears consumes the applied power in excessive friction, elasticity, etc. These difficulties were studiously met and successfully solved by Mr. C. F. Hirn, of Colmar, Haut Rhin, in the year 1860; the practical working of his invention was partially displayed at the exhibition of 1862. In the park of the present Exposition, his system is clearly shown by the operation of a centrifugal pump, deriving its power from a stationary engine, working on the opposite side of the artificial lake, and distant some 500 ft. from the pump. This so-called "telodynamic system is based on the substitution of a high velocity developed in a small mass, for its converse; namely, large mass moving with small velocity. The power conductor is simply a light wire rope, passing over pulleys of large diameter, and upheld at intervals of about four hundred feet by support-pulleys. The construction of these pulleys, and their supports, is shown by the accompanying figures, 1 and 2, giving a side view and end view, and a section of the rim of the pulley.

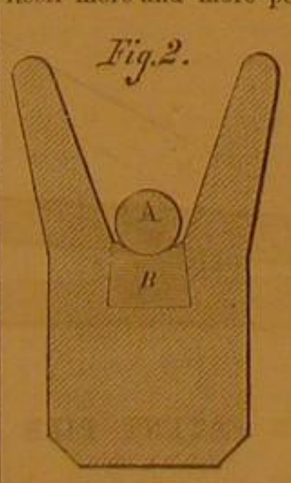
Fig. 1.



Supports for Hirn's Telodynamic Cable.

The two extreme pulleys, or those which receive and distribute the power, are rotated at speeds having a circumferential velocity of 1,800 to 4,800 feet per minute. It has been the practice to make these of cast iron, but steel is recommended where higher velocities are necessary. The face of the pulley is channeled by a deep V-groove, while the bottom of the latter has a filling of gutta-percha which adapts itself more and more perfectly to the rope and entirely prevents slip and wear. Fig. 2 is a section of the rim of the support pulley, showing the cable A, resting upon the gutta-percha cushion, B. Herein lies the secret of its practical success; a result only attained after most discouraging experiments upon pulleys constructed successively of copper, wood, cast iron, etc., with facings of leather, india-rubber, horn, lignumvitæ, and boxwood. Experience has proved that the loss of power by the telodynamic system is quite trifling, and arises mainly from the resistance of the air to the arms of the pulleys, the friction of their axles, as well as the rigidity of the rope in its passage over the pulleys.

Fig. 2.



It has been found that two pulleys, twelve feet in diameter, making 100 revolutions per minute, with a cable of seven sixteenths of an inch diameter, can, by means of a circumferential velocity of 4,000 feet per minute, transmit 120-horse power (to distances less than 400 feet) without sustaining a loss of more than two and one half per cent. If this limit is exceeded, it will become necessary to introduce support pulleys of seven feet diameter, and for these there should be estimated a mechanical loss of about one per cent per 3,300 feet of distance traveled. The pecuniary expense, independent of the ground rent, amounted to $1,000 (gold) per 3,300 feet, plus $600 for the receiving and distributing pulleys, with their respective shafts and supports. It is evident that this system cannot be limited in its application by rectilinear transmission, but is susceptible of all the changes in direction which inclined pulleys can command. There are already between 400 and 500 instances of its employment in connection with the manufacturing interests of the continent. Its advantages in respect to our own country can hardly be overestimated.

CADMIUM AND ITS USES.

BY PROF. C. A. JOY, OF COLUMBIA COLLEGE.

Seven cities dispute the right of having given birth to the immortal Homer, and seven men claim the honor of having discovered cadmium. A learned German has tried to show that Homer was a myth. Cadmium was named after the mythical *cadmia*, but is, nevertheless, a reality.

It was in 1818, just fifty years ago, that the attention of chemists was called to some samples of zinc that were sold for medicinal purposes; they gave, when in solution, a suspiciously yellow color with sulphureted hydrogen, and hence were condemned as containing arsenic. A number of chemists were furnished with specimens for examination, and several of them got on track of a new metal at the same time.

Frederick Stromeyer, who was born in Gœttingen, in 1778, and was for many years professor of chemistry at the University in his native city, until his death in 1835, was the first to publish a full account of investigations into the properties of the new substance in September, 1818, and he gave to the metal the name of cadmium.

Karsten simultaneously proposed to call it melinium, from the quince-yellow color of one of its compounds; Gilbert gave it the name of junonium, from the planet Juno, and John christened it klaprothium, after a famous chemist; but all of these strange appellations have been eliminated from our nomenclature, and cadmium is the only one recognized in modern times.

The discovery of cadmium forms an era in the line of scientific research. It was the first metal found in a compound and not in an ore, and it could not have been detected until chemical analysis had reached an advanced state of accuracy. Traces of it were soon found in zinc ores, but it was not until after the lapse of twenty years from the time of Stromeyer's publication, that an ore of cadmium was discovered. Lord Greenock, at that time, described a mineral which had been picked up on his estate, and which proved to be a cadmium blende, analogous to zinc blende, or to galena. The new ore was called greenockite, and since that time it has been found in various localities; it is, however, a very rare mineral.

For commercial purposes, we obtain the metal from zinc ores and furnace deposits. By subjecting zinc to downward distillation, the first portions that come over often contain cadmium. The pure metal is obtained by dissolving the regulus in sulphuric acid, and converting it into a sulphide, by means of sulphureted hydrogen, then re-dissolving and re-precipitating, by carbonate of ammonia, and reducing with a proper flux. As thus obtained, it is a white, soft, malleable, ductile metal, eight and one half times heavier than water. It leaves a mark upon paper the same as lead, and when bent gives out a creaking sound, similar to that known as the "tin cry." It can be distilled the same as zinc, but unlike zinc, when it is set on fire and burns, it gives a brown oxide. It sometimes happens that zinc-white is contaminated by this brown powder and rendered worthless as a paint. Cadmium melts at about 440° Fah., and when alloyed with other metals, causes them to fuse at a lower temperature; a very little of it renders copper very brittle. Seventy-eight parts of cadmium, and twenty-two parts of mercury, was, for a long time, used for plugging teeth, but, as the amalgam oxidizes easily and turns yellow, and the mercury proves injurious to health, this application is pretty much abandoned. Mr. Abel has proposed an alloy for jewelers' use, which is said to be very malleable and ductile, and to possess a fine color. It is composed of 750 parts of gold, 166 parts of silver, and 84 parts of cadmium. We had occasion, when giving an account of the properties of bismuth, to speak of the very fusible alloys composed of bismuth, tin, lead, and cadmium; they melt at a point much lower than cadmium itself.

It is as a yellow paint that cadmium compounds are the most highly prized. By mixing a solution of gum arabic, chloride of cadmium and hyposulphite of soda together, we obtain a fine yellow paint, which is one of the most durable known to artists. There are other ways of making it, and the purity of color depends very much upon the absence of metals that turn black when mixed with sulphur, and the care with which it is dried. The very property that led to the condemnation of zinc-white, and which ultimately brought about its discovery, is the yellow color, now most frequently turned to valuable account.

The keeping properties of the collodion, made sensitive by the iodide and bromide of cadmium, have made these salts great favorites with photographers, and a new use for cadmium has sprung up of late years in this direction.

Manufacturers are getting more into the habit of saving the furnace and flue dust of zinc works, and of separating the cadmium from them, and in this way the supply of the metal is increasing. Salts of cadmium find application in medicine. The sulphate is applied to the eyes to remove specks from the cornea, the nitrate produces violent vomiting and purging, and, in general, when taken internally, the

salts can only be employed in very small doses, as recent experiments of Monsieur Marme have shown them to be violent poisons. The best antitode is the carbonate of soda and the white of an egg.

The following mixture burns with a brilliant white flame, surrounded by a magnificent blue border: Salpeter, 20 parts; sulphur, 5 parts; sulphide of cadmium, 4 parts; lamp black, 1 part.

This can be moistened and made up into balls or candles, and ignited after the manner of a fuse.

We have thus given the history and prominent applications of the rare metal, cadmium.

Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

Improved Apparatus for Extinguishing Fire Wanted.

MESSRS. EDITORS:—I have read with interest your recent article regarding losses by fire from steam heating apparatus. Last winter we had a hot house, the property of Denn s Bowen, Esq., of this city, destroyed by fire. I gave it my opinion that the cause of it was from their heating pipes, which were directly under the wooden platform where the fire first appeared, but those who claim to be competent judges scouted the idea.

It seems to me that the sprinkler apparatus used in the woolen mills, alluded to in your paper, week before last, would be an excellent thing to use in our elevators in this city, which invariably burn up, when they catch fire, owing to the combustible material of which they are made, and the draft caused by the bins running from the top to the bottom of the elevator. I wish you would wake up some of the scientific men to making improvements in the manner and machinery of extinguishing fires, it seems to be the most neglected of all the branches of business. To be sure there has been considerable improvement made, such as the steam fire engines, fire alarm, telegraph, etc., etc. But don't you think that there is still further improvement to be made? It seems to me that a fire engine can be made which does not weigh over three thousand pounds, and still be as effective as the ones which are now used that weigh seven thousand pounds.

I have taken great pleasure in reading your valuable paper, and I hope it may long continue in its field of usefulness.

PETER C. DOYLE.

Buffalo, N. Y.

Purifying Drinking Water.

MESSRS. EDITORS:—Your correspondent in No. 9, present volume, suggests a very good remedy for keeping water pure; but it is at the cost of extra care, and manual labor, and expense of an air pump which requires close attention to operate successfully for any length of time.

My remedy is to use a pump that will give a slight agitation to the water every time the pump is used. I used in a large cistern a Joyce submerged pump, which consists of a semicircular cylinder, with arms extending out each side, and operating on a pivot to force the two plungers back and forth in the cylinder. These arms were connected by rods to a double handle at the top to give motion. This plunger with the two rods produced an agitation that kept the cistern water sweet for years. The pump was located a few inches from the bottom, and it never produced roiling.

As the pump was used from twenty to fifty times a day, I think it was more efficient than would be an air pump, with the great liability of neglect. There are similar pumps in use, but I can speak from experience of this one only.

Omaha, Nebraska. J. M. G.

Boiler Test Proposed.

MESSRS. EDITORS:—I would suggest through your valuable paper that at the coming exhibition of the American Institute this fall, a test of steam boilers should be made to ascertain what boiler will produce the most steam power with a given consumption of fuel.

The proper way to test them would be to have a tank full of water in which a propeller wheel of coarse pitch connected to a 40-horse power engine is arranged to work. The boiler that gets the greatest number of turns out of the wheel with least consumption of fuel should be pronounced the champion boiler.

If a test of this kind takes place, I, for one, will furnish a 40-horse power boiler of my patent.

HUGH LESLIE.

Jersey City, N. J.

[Our correspondent is perfectly safe in this challenge. The American Institute will not commit themselves, we understand, to any test of boilers this year; but if they would do so, they would scarcely permit so unscientific and unsatisfactory a method as our correspondent proposes. We have asserted and reasserted over and over again that the only reliable test of a boiler is its evaporative power compared with the fuel it consumes, and yet our readers will persist in complicating the problem by saddling some other condition upon it. As well might it be proposed to test a boiler by running an engine and a cotton mill with it as an engine and propeller wheel. Believe us, friends, an engine and boiler are two distinct animals. They don't belong even to the same genus, let alone species. To test the speed of a horse we do not tie an elephant to his tail and run the two together.—EDS.

AS FAR as man can go back in time, says Dumas, as far as man can reach by observation in space, the concrete elements of matter present the same character as Lavoisier's elements.

POOR TIME.---HOW TO DOCTOR DISABLED CLOCKS.

WRITTEN FOR THE SCIENTIFIC AMERICAN BY F. P. WARREN.

As the worm is to fruit, making it deformed and one-sided, so are poor timepieces to our lives, making them unsteady and irregular. We can plainly see that there is much loss of time in being too early, or too late for meals, for trains, and for engagements, or that the broken rest, taxing the mind with the rising hour, and standing in the cold waiting for the train, will affect the health; but we little realize the unconscious influence that living by a poor timepiece has in forming unsteady and irregular habits in a family. It is a secret enemy, and as such, should be conquered, and trained a trusty servant, or destroyed like the vermin of the house, or the weeds of the garden. And on every mantle, be it palace or mansion, cottage or hovel, should stand a clock that can be depended upon.

WHAT IS THE MATTER WITH THE OLD CLOCKS?

Resinous dust mixes with the oil on clock pivots and forms a wax, which, when thick enough, will stop the clock. As a grinding tool can be made with diamond dust embedded in brass, which will continue to cut till no brass remains to hold the dust; so sand and gritty dust is caught by oiled clock pivots and ground into the brass, where it remains embedded, even after the most thorough cleaning. The particles of grit, together with bits of steel, ground from the pivots, can be plainly seen with a good microscope. Grit grinds the pivots of clocks rough, and often grains of sand are embedded in flaws and rough places. Such pivots will soon cut out new bushing.

THE REMEDY.

Scrape the bearings and polish the pivots.

PIVOT POLISHING.

This may be done by means of a very simple lathe made of a piece of board, cut something like a boot-jack, the hole about two inches square, with a wood center or plug in one ear, holding one pivot, the other ear cut off even with the plug and notched to receive the pivot to be polished; a small bow, with a violin string, running on the pinion or arbor, turns the wheel, while a few strokes of the pivot file on the pivot, will polish like glass. It requires a little practice to get used to working the bow, and the pivot file, in opposite directions, at the same time, but, when familiar with the operation, pivots are easily and speedily polished. There should be two holes in the end of the plug, and two corresponding notches in the end of the short ear, to receive both large and small pivots. The plug should be held with a thumb screw so that it can be easily varied to suit the different lengthed arbors. A common wood screw, with the head altered, will answer.

This "board lathe" can be held upright in a vise, or otherwise conveniently fastened. The common "verge lathe," with wood centers, will work well with small wheels, but there is not swing enough for the large ones, which often need polishing the most.

TO MAKE A PIVOT FILE.

Grind a common flat file perfectly smooth, roughen with emery paper, and always use with oil.

TO BUSH.

Bend sheet brass into a tube with the hole the size of the pivot; ream the unworn side of the hole in the clock plate till the hole is round, then ream equally to the size of the tube, beveling the edges; swedge the tube in, and dress to the proper size.

The common way of bushing is to close the hole with a punch, but this, closing only near the edge, leaves a poor bearing. A better way is to cut a hole through the plate about one-eighth of an inch from the pivot hole, with a narrow chisel. The pivot hole will close as the chisel hole is enlarged, and can be reamed out to make a good bearing. The chisel should be about one-twelfth of an inch wide, gradually enlarging back from the edge.

CLEANING CLOCKS—HOW NOT TO CLEAN A CLOCK.

Forget to let the springs down; bend the escape wheel points awkwardly, working at the pin underneath; raise the upper plate a little, and the clock will come to pieces itself. Go around the room and pick up the wheels, not noticing the bent cogs and pivots, and lay them together, where the boys can play with them while you are cleaning. Wipe the plates with an old, greasy, sticky chamois skin or rag, clean the holes with a dirty string, and, if the boys' fingers are quite dirty (and what boys' are not who are always handling things?) let them hold and hand you the wheels, when you find a place for them. If the clock does not go together good, loose your temper and make it; if the wires are in the way, bend them out, and when the clock is together, bend them again to make it strike right. After handling the verge and touching the escape wheel points with your sticky fingers, oil the whole clock profusely—get your pay—and then, if it don't run till "taken home," or till you get "around the corner," tell the owner it is worn out and advise him to buy a new one.

HOW TO CLEAN A CLOCK.

Touch watch oil to the pivots, and run the wheels to loosen the dirt; too deep and too shallow gear notice, and mark the holes that need bushing; tie the springs with strong cord, loosen the click spring, and let them down steadily by the key turning in the palm of the hand. If the two largest wheels of the trains are alike, mark the strike side, that there may be no mistake in putting together. Wipe thoroughly every part of the works with a clean rag. Clean the cogs with a pack of cards riveted together. If the clock is old, scrape them with a sharp knife; polish the pivots if at all rough or worn, and clean with a fresh rag pressed well against the shoulder with the thumb nail. The pivot holes, if the pivots are worn rough, should be lightly scraped with a sharp reamer, and cleaned with a pine stick till they no longer blacken it.

PUTTING UP CLOCKS.

Always work slow, and pin as you go, using shoemakers' zinc nails.

Time train wheels are always plain; the wheels of the striking train have something attached to them, either plates, pins, or wires.

If you bear in mind that larger wheels gear into the pinions of smaller, you can hardly place them wrong; but the strike wheels must so gear, that the wire with a poker crook will drop into its notch at the same instant of the bell hammer stroke, and the crank of the fly wheel, when at rest, should be opposite to the wire which catches it before striking. The drop of the escape wheel on the verge being lost power, they should be as near together as possible, and allow the sure escape of the teeth; but, as the escape wheel is held from the verge by the power, it should be pressed toward it during a trial of one revolution, or the teeth will catch whenever the power is slack, as on cold nights.

Oil freely, with the best watch oil, the different bearing parts of the verge; other parts will run longer and wear less without.

Wooden clocks can be made as good as new by returning the pivots and bushing the bearings with brass. The balance pivots of marine levers, when worn, should be re-turned and re-tempered.

A clock cannot be well regulated with the pendulum loose at the point of suspension.

Chemical Discovery in the Past Year.

In the inaugural address of Professor Stokes, President of the British Association, made at the opening of the annual meeting, held this year, at Exeter, England, he made the following remarks on the progress of chemical discoveries: In chemistry I do not believe that any great step has been made within the last year; but perhaps there is no science in which an earnest worker is so sure of being rewarded by making some substantial acquisition to our knowledge, though it may not be of the nature of one of those grand discoveries which from time to time stamp their impress on different branches of science. I may be permitted to refer to one or two discoveries which are exceedingly curious, and some of which may prove of considerable practical importance.

The Turaco, or plantain-eater of the Cape of Good Hope, is celebrated for its beautiful plumage. A portion of the wings is of a fine red color. This red coloring matter has been investigated by Professor Church, who finds it to contain nearly six per cent of copper, which cannot be distinguished by the ordinary tests, nor removed from the coloring matter without destroying it. The coloring matter is, in fact, a natural organic compound, of which copper is one of the essential constituents. Traces of this metal had previously been found in animals, for example, in oysters, to the cost of those who partook of them. But in these cases the presence of the copper was merely accidental; thus oysters that lived near the mouths of streams which came down from copper mines, assimilated a portion of the copper salt, without apparently its doing them either good or harm. But in the Turaco, the existence of the red coloring matter which belongs to their normal plumage, is dependent upon copper, which, obtained in minute quantities with the food, is stored up in this strange manner in the system of the animal. Thus in the very same feather, partly red and partly black, copper was found in abundance in the red parts, but none or only the merest trace in the black.

This example warns us against taking too utilitarian a view of the plan of creation. Here we have a chemical substance elaborated which is perfectly unique in its nature, and contains a metal the salts of which are ordinarily regarded as poisonous to animals; and the sole purpose to which, so far as we know, it is subservient in the animal economy is one of pure decoration. Thus a pair of the birds which were kept in captivity lost their fine red color in the course of a few days, in consequence of washing in the water which was left them to drink, the red coloring matter, which is soluble in water, being thus washed out; but except as to the loss of their beauty it does not appear that the birds were the worse for it.

A large part of the calicoes which are produced in this country in such enormous quantities are sent out into the market in the printed form. Although other substances are employed, the place which madder occupies among dye stuffs with the calico printer, is compared by Mr. Schunck, to that which iron occupies among metals with the engineer. It appears from the public returns that upwards of 10,000 tuns of madder are imported annually into the United Kingdom. The colors which madder yields to mordanted cloth, are due to two substances, alizarine, and purpurine, derived from the root. of these alizarine is deemed the more important, as producing faster colors, and yielding finer violets. In studying the transformations of alizarine under the action of chemical reagents, MM. Graebe and Liebermann were led to connect it with anthracene, one of the coal tar series of bodies, and to devise a mode of forming it artificially. The discovery is still too recent to allow us to judge of the cost with which it can be obtained by artificial formation, which must decide the question of its commercial employment. But assuming it to be thus obtained at a sufficiently cheap rate, what a remarkable example does the discovery afford of the way in which the philosopher quietly working in his laboratory may obtain results which revolutionize the industry of nations! To the calico printer, indeed, it may make no very important difference whether he continues to use madder, or replaces it by the artificial substance; but what a sweeping change is made in the madder-growing interest! What hundreds of acres hitherto employed in the madder cultivation are set free for

the production of human food, or of some other substance useful to man! Such changes can hardly be made without temporary inconvenience to those who are interested in the branches of industry affected; but we must not on that account attempt to stay the progress of discovery, which is conducive to the general weal.

How to Determine the Strength of Rough Castings.

It is not uncommon for the engineer and machinist, when ordering castings for a specified purpose, to give the proportions in which the mixture of pig shall be made, with a view to obtaining a given strength in the proposed casting. This course cannot be supposed to be an accurate guide to the determination of the casting when completed, since there are several causes which may reduce their strength during the melting, pouring, and cooling of the casting, and the dishonesty or carelessness of the founder may also defeat the end proposed.

When it is important that a given strength should be obtained, it is recommended by one of the highest engineering authorities, Professor Rankine, that the best course for the engineer to pursue is not to specify to the founder any particular kind or mixture of pig iron, but to specify a certain minimum strength which the iron should show when tested by experiment.

As to the appearance of good iron for castings, it should have on the outer surface a smooth, clear, and continuous skin, with regular faces and sharp angles. When broken, the surface of fracture should be of a light blueish-gray color and close-grained texture, with considerable metallic luster; both color and texture should be uniform, except that near the skin the color may be somewhat lighter and the grain closer; if the fractured surface is mottled, either with patches of darker or lighter iron, or with crystalline spots, the casting will be unsafe; and it will be still more unsafe if it contains air bubbles. The iron should be soft enough to be slightly indented by a blow of a hammer on an edge of the casting. When cut by tools of different kinds, the iron should show a smooth, compact, and bright surface, free from bubbles and other irregularities, of a uniform color, and capable of taking a good polish.

Castings are tested for air bubbles by ringing them with a hammer all over the surface.

Cast iron, like many other substances, when at or near the temperature of fusion, is a little more bulky for the same weight in the solid than in the liquid state, as is shown by the solid iron floating on the melted iron. This causes the iron as it solidifies to fill all parts of the mold completely, and to take a sharp and accurate figure. The solid iron contracts in cooling from the melting point down to the temperature of the atmosphere, by about one per cent in each of its linear dimensions, or one eighth of an inch in a foot nearly; and therefore patterns for castings are made larger in that proportion than the intended pieces of cast iron which they represent.

The rate of linear expansion of cast iron between the freezing and boiling points of water is about ·00111.

A convenient instrument in making patterns for castings is a contraction rule; that is, a rule on which each division is longer in the proportion already mentioned than the true length to which it corresponds.

In designing patterns for castings, care must be taken to avoid all abrupt variations in the thickness of metal, lest parts of the casting near each other should be caused to cool and contract with unequal rapidity, and so to split asunder or overstrain the iron. It is advantageous also that castings, especially those for moving pieces in machinery, such as wheels, should be of symmetrical figures, or as nearly so as is consistent with their purposes, in order that they may have no tendency to become distorted while cooling.

Iron becomes more compact and sound by being cast under pressure; and hence cast-iron cylinders, pipes, columns, shafts, and the like, are stronger when cast in a vertical than in a horizontal position, and stronger still when provided with a head, or additional column of iron, whose weight serves to compress the mass of iron in the mold below it. The air bubbles ascend and collect in the head, which is broken off when the casting is cool.

Care should be taken not to cut or remove the skin of a piece of cast-iron more than is absolutely necessary, at those points where the stress is intense. In order that this rule may be carried out in pieces (such as toothed wheels) which are shaped to an accurate figure by cutting or abrading tools, care should be taken to make them as nearly as practicable of the true figure by casting alone, so that the depth of skin to be cut away may be as small as possible.

Discovery of America by the Chinese.

Was Columbus the first discoverer of America, or did he only re-discover that continent after it had, in remote ages, been found, peopled, and forgotten by the Old World? A writer in the *Gentleman's Magazine* thinks it is curious that this question has not been more generally raised, for it is very clear that one of two things must be true: either the people whom Columbus found in America must have been descended from emigrants from the Old World, and therefore America was known to the Old World before Columbus' time, or else the aborigines of the Western Hemisphere were the result of spontaneous human generation, the development of man from a lower species of animal, or descended from a second Adam and Eve, whose origin would be equally puzzling. Unless we are prepared to cast aside Holy Writ, and all our general notions of the origin of the human race, we must believe that there was at one time communication between the Old World and the New. Probably this communication took place on the opposite side of the world to ours, between the eastern coast of Asia and the side of America most remote from Europe; and I believe it is quite possible that the inhabitants of Eastern Asia may have been aware of the existence of America, and kept up intercourse with it while our part of the Old World never dreamt of its existence. The impenetrable barrier the Chinese were always anxious to preserve between themselves and the rest of the nations of the Old World renders it quite possible that they should have kept their knowledge of America to themselves, or, at any rate, from Europe. The objection that the art of navigation in such remote times was not sufficiently advanced to enable the Chinese to cross the Pacific and land on the western shore of America is not conclusive, as we have now found that arts and sciences which were once generally supposed to be of quite modern origin, existed in China ages and ages before their discovery in Europe. The arts of paper-making and printing, among others, had been practiced in China long before Europeans had any idea of them. Why, then, should not the Chinese have been equally, or more, in advance of us in a navigation? The stately ruins of Baalbec, with gigantic arches across the streets, whose erection would puzzle our modern engineers, the Pyramids, and other such remains of stupendous works point to a state of civilization, and the existence of arts and sciences, in times of which European historians give no account.

One fact corroborative of the idea that the Old World, or at least some of the inhabitants of Asia were once aware of the existence of America before its discovery by Columbus is that many of the Arabian *ulema* with whom I have conversed on this subject, are fully convinced that the ancient Arabian geographers knew of America, and in support of this opinion point to passages in old works in which a country to the west of the Atlantic is spoken of. An Arab gentleman, a friend of mine, General Hussein Pasha, in a work he has just written on America, called *En-Nessr-Et-Tayir*, quotes from Djeldeki and other old writers to show this.

There is, however, amongst Chinese records not merely vague references to a country to the west of the Atlantic, but a circumstantial account of its discovery by the Chinese long before Columbus was born.

A competent authority on such matters, J. Haulay, the Chinese interpreter in San Francisco, has lately written an essay on this subject, from which we gather the following startling statements drawn from Chinese historians and geographers.

Fourteen hundred years ago even America had been discovered by the Chinese, and described by them. They stated that land to be about 20,000 Chinese miles distant from China. About 500 years after the birth of Christ, Buddhist priests repaired there, and brought back the news that they had met with Buddhist idols and religious writings in the country already. Their descriptions, in many respects, resemble those of the Spaniards a thousand years after. They called the country "Fusany," after a tree which grew there, whose leaves resemble those of the bamboo, whose bark the natives made clothes and paper out of, and whose fruit they ate. These particulars correspond exactly and remarkably with those given by the American historian, Prescott, about the maquay tree in Mexico. He states that the Aztecs prepared a pulp for paper-making out of the bark of this tree. Then, even its leaves were used for thatching; its fibers for making ropes; its roots yielded a nourishing food; and its sap, by means of fermentation, was made into an intoxicating drink. The accounts given by the Chinese and Spaniards, although a thousand years apart, agree in stating that the natives did not possess any iron, but only copper; that they made all their tools, for working in stone and metals, out of a mixture of copper and tin; and they, in comparison with the nations of Europe and Asia, thought but little of the worth of silver and gold. The religious customs and forms of worship presented the same characteristics to the Chinese fourteen hundred years ago as to the Spaniards four hundred years ago.

There is, moreover, a remarkable resemblance between the religion of the Aztecs and the Buddhism of the Chinese, as well as between the manners and customs of the Aztecs and those of the people of China. There is also a great similarity between the features of the Indian tribes of Middle and South America, and those of the Chinese, and, as Haulay, the Chinese interpreter of whom we spoke above, states, between the accent and most of the monosyllabic words of the Chinese and Indian languages. Indeed, this writer gives a list of words which point to a close relationship; and infers therefrom that there must have been emigration from China to the American continent at a most early period indeed, as the official accounts of Buddhist priests fourteen hundred years ago notice these things as existing already. Perhaps, now, old records may be recovered in China which may furnish full particulars of this question. It is, at any rate, remarkable and confirmative of the idea of emigration from China to America at some remote period, that at the time of the discovery of America by the Spaniards, the Indian tribes on the coast of the Pacific, opposite to China, for the most part, enjoyed a state of culture of ancient growth, while the inhabitants of the Atlantic shore were found by Europeans in a state of original barbarism. If the idea of America having been discovered before the time of Columbus be correct, it only goes to prove that there is nothing new under the sun; and that Shelley was right in his bold but beautiful lines: "Thou canst not find one spot whereon no city stood." Admitting this, who can tell whether civilization did not exist in America when we were plunged in barbarism? and, stranger still, whether the endless march of ages, in rolling over our present cultivation, may not obliterate it, and sever the two hemispheres once again from each other's cognizance? Possibly, man is destined, in striving after civilization, to be like Sisyphus, always engaged in rolling up a stone which ever falls down.

Effects of Hashish.

This drug, the *Cannabis Indica* of the U. S. Pharmacopœia, the resinous product of hemp, grown in the East Indies, and other parts of Asia, is used in those countries to a large extent for its intoxicating properties, and is doubtless used in this country for the same purpose to a limited extent. Its effects, although perhaps similar in some respects upon all who take it, yet vary considerably according to the constitution of the individual, condition of mind and body, etc., at the time of its administration. A writer in *Appleton's Journal* gives his personal experience of its effects as follows:

"I have often taken the drug, rather for curiosity to discover what its attractions might be, than for aught of pleasurable excitement I ever experienced. The taste of the potion is exactly what a mixture of milk, sugar, pounded black pepper, and a few spices would produce. The first result is a contraction of the nerves of the throat, which is anything but agreeable. Presently the brain becomes affected; you feel an extraordinary lightness of head, as it were; your sight settles upon one object, obstinately refusing to abandon it; your other senses become unusually acute—uncomfortably sensible—and you feel a tingling which shoots like an electric shock down your limbs till it voids itself through the extremities. You may stand in the burning sunshine without being conscious of heat, and every sharp pain is instantly dulled. Your cautiousness and your reflective organs are painfully stimulated; you fear everything and everybody, even the man who shared the cup with you, and the servant who prepared it; you suspect treachery everywhere, and in the simplest action detect objects the most complexedly villainous. Your thoughts become wild and incoherent, your fancy runs frantic. If you happen to exceed a little, the confusion of your ideas and the disorder of your imagination will become intense. I recollect on one occasion being persuaded that my leg was revolving upon its knee as an axis, and could distinctly feel as well as hear it strike against and pass through the shoulder during each revolution. Any one may make you suffer agony by simply remarking that a particular limb must be in great pain, and you catch at every hint thrown out to you, nurse it and cherish it with a fixed and morbid eagerness that savors strongly of insanity. This state is a very dangerous one, especially to a novice; madness and catalepsy being by no means uncommon terminations to it. If an assembly are under the influence of the drug, and a single individual happen to cough or laugh, the rest, no matter how many, are sure to follow his example. The generally used restoratives are a wineglassful of pure lemon-juice, half a dozen cucumbers eaten raw, and a few puffs of the hookah; you may conceive the state of your unhappy stomach after the reception of these remedies. Even without them you generally suffer from severe indigestion, for, during the intoxication, the natural hunger which the hashish produces excites you to eat a supper sufficient for two days with ordinary circumstances.

How to Make Paper Transparent.

Artists, architects, land surveyors, and all who have occasion to make use of tracing paper in their professional duties will be glad to know that any paper capable of the transfer of a drawing in ordinary ink, pencil, or water colors, and that even a stout drawing paper, can be made as transparent as the thin yellowish paper at present used for tracing purposes. The liquid used is benzine. If the paper be damped with pure and fresh distilled benzine it at once assumes a transparency, and permits of the tracing being made, and of ink or water colors being used on its surface without any "running." The paper resumes its opacity as the benzine evaporates, and if the drawing is not then completed, the requsite portion of the paper must be again damped with the benzine. The transparent calico, on which indestructible tracings can be made, was a most valuable invention, and this new discovery of the properties of benzine will prove of further service to many branches of the art profession, in allowing the use of stiff paper where formerly only a slight tissue could be used.

Annual Exhibition of the Montgomery County and East Pennsylvania Aggricultural and Mechanical Society.

The annual exhibition of this association is announced. It will be held on the grounds of the society, near Norristown, Pa., on Thursday, Friday, and Saturday, September 23d, 24th, and 25th, 1869. The book of entries will be open at the office in Norristown, on and after Tuesday, the 11th day of September. Exhibitors must have their articles and animals entered on the Secretary's book, on or before Thursday evening, September 23d. Where partners or firms exhibit as such, each member of the firm who attends as an exhibitor, must have an exhibitor's ticket.

Communications may be addressed to A. S. Hallman, corresponding secretary, Norristown, Pa.

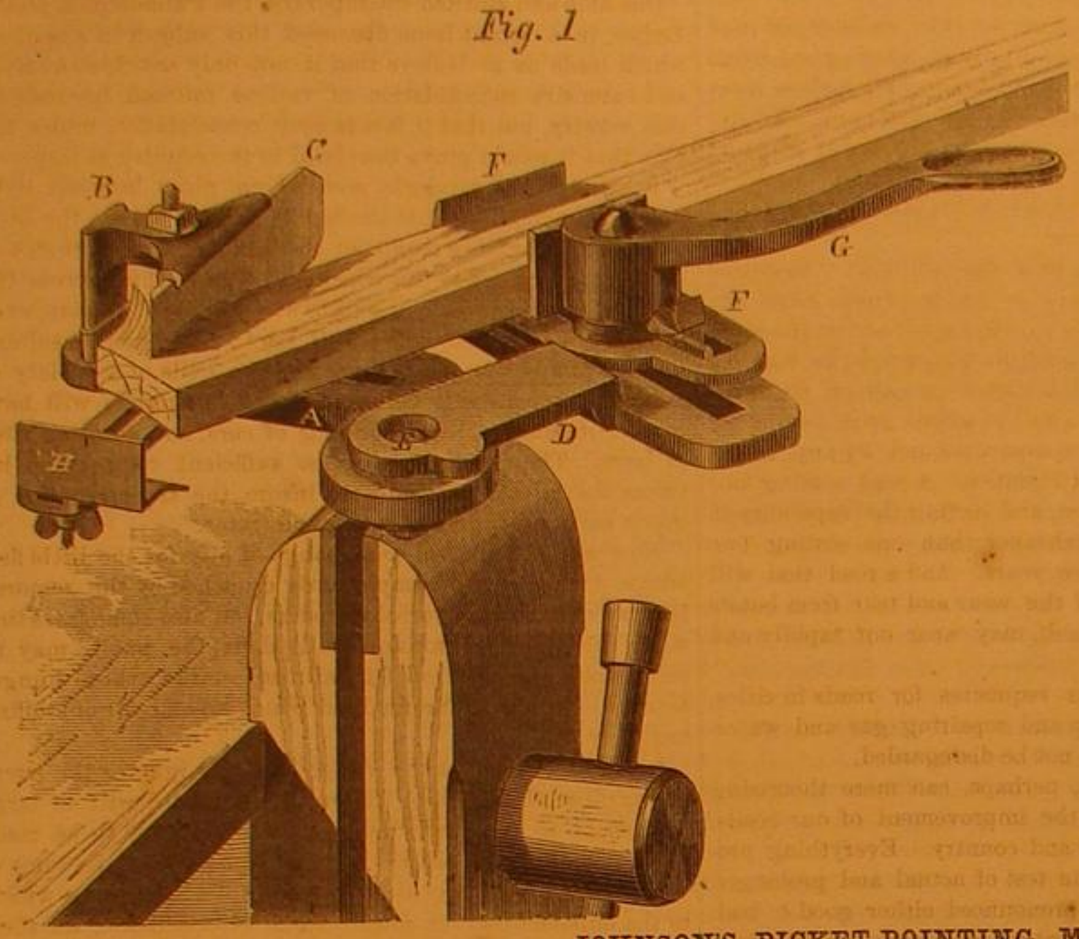
FIXING COLORS ON TEXTILE FABRICS.—Solutions of iron, copper, manganese, or chromium, either pure, singly, or mixed together, or in conjunction with coloring matters, are by this process employed for printing on textile fabrics, which consist of wool and cotton, wool and thread, goat's-hair and cotton, etc., and on all other tissues composed of a mixture of textile, vegetable, and animal matters, either by means of the cylinder printing machine or otherwise, the process being the same as that for printing thread tissues, thread and cotton, or cotton. The fabrics are allowed to oxidize after the application; the oxidation being completed by subjecting them to an alkaline or bichromate bath. The advantages of the application of this system to the tissues named, is that the colors or tints obtained are unchangeable either by the action of light or washing.

Improved Picket-Pointing Machine.

The object of this invention is to point the ends of pickets or fence-palings, and to cut circular sides or edges on other wood-work; and it is one of the most simple and perfect working devices lately brought to our notice. It not only does its work rapidly but in the most perfect manner, and in the adaptation of ends to means, displays much more ingenuity than is commonly met with in machines of a similar character.

It consists in attaching an ordinary carpenters' plane-bit to an iron frame, on which is pivoted an arm for holding the picket, or other article of wood, in such a manner, that by turning the said arm on its pivot with the picket, the plane-bit shall cut one side near the end in an arc of a circle at one movement. By this means pickets may be pointed or dressed to shape at the ends with great expedition and accuracy, and with a saving of much of the labor expended in the ordinary manner of performing this kind of work.

Fig. 1



JOHNSON'S PICKET-POINTING MACHINE.

The machine is held firmly by a lug either in a vice as shown in Fig. 1, or wedged in a notch on a bench. The lug is attached to, and supports the bed-plate, A, Fig. 1. On one side of the bed-plate, A, is secured an adjustable clamp, B, in which is held a plane-bit, C, having its edge in a vertical position; and on the opposite side of the bed plate a swinging arm, D, is pivoted at E, to turn horizontally, with a sliding and adjustable clamp, F, operated by an eccentric lever, G, for holding pickets of different sizes, placed in the clamp as shown. In front of the plane bit, C, is placed an adjustable slide or gage, H, against which the end of the picket is placed while it lies in the clamp, F, to regulate the pointing or cutting of the plane bit.

When the picket is thus placed in position as shown, it is held tight in the clamp, F, by the lever and eccentric, G, and then by drawing the outer end of the picket, which now acts as a lever, towards him, the operator swings it around with the arm, D, on the pivot, E, so that the side of the picket near the end, is brought against the edge of the plane bit, and cut in the arc of a circle. The operation being repeated with the other side of the picket, the work is accomplished.

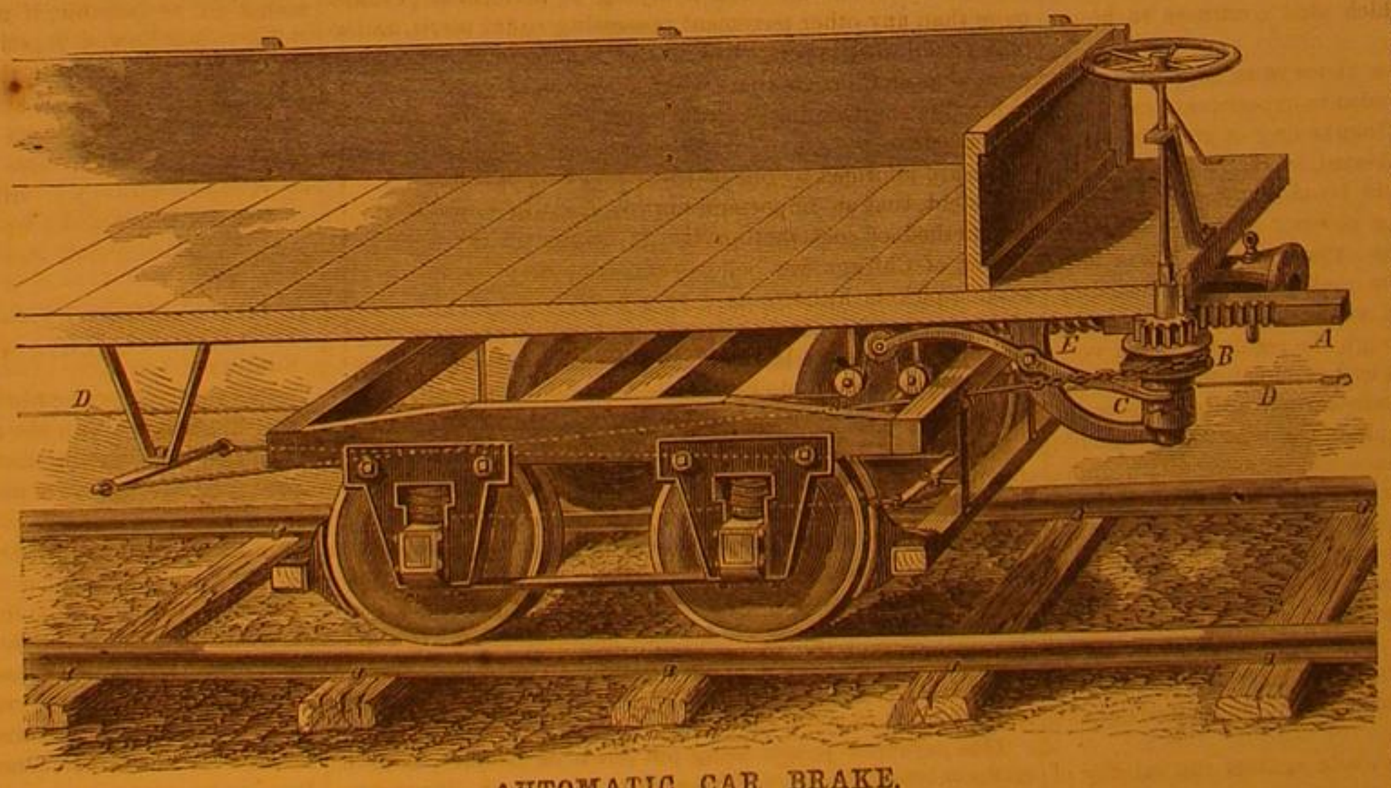
Figs. 1 and 2, respectively, exhibit applications of lumber cut in this form to fences and eaves. Patented Jan. 14, 1868, through the Scientific American Patent Agency. For particulars address W.W. Johnson, Nashville, Tenn., who will sell the right for all the States except Georgia and Tennessee.

Automatic Car Brake.

The object of this invention is to place the whole line of brakes throughout a railway train at the disposal of the engineer, and to employ the reverse motion of the engine in case of emergency, or its resistance to the onward motion of the train when slowing up, to operate the brakes at the will of the engineer. At the same time it is not proposed to dispense with brakemen on fast trains, or to do more than to add to the safety of such trains by securing prompt and efficient action of all the brakes in times of peril.

The apparatus is simple and cheap, does not demand any change in the present construction of cars or locomotives, and is controlled by the engineer through the medium of a small cord running from the locomotive back under the entire train.

Its construction and operation will be readily comprehended by referring to the accompanying engraving. A is a bar of iron lying parallel to the longitudinal axis of the car, with a rack upon one side, which engages with a stout pinion attached to the break wheel shaft. The chain pulley, B, has a clutch attached to its under side, which clutch is operated by a collar and the lever, C. The end of the lever C remote from the clutch bar has a small pulley attached to it over which the cord, D, runs. The cord also passes under two fixed pulleys as shown in the engraving, so that when drawn tight it depresses the end of the lever C, and raises the clutch out of gear. In this position the brakes do not operate and the train may be backed. In going ahead the clutch is dropped into gear and the breaks operate as follows: When the engine is checked in its onward motion, the first car to the rear presses checked in its onward motion, the first car to the rear presses the end of the bar, A, against the rear of the tender. The bar yields to the pressure, and imparts motion through the pinion to the brake wheel shaft, the chain is wound up, and the brakes are put on. This car being thus checked in its motion, the next in order approaches it, and the same operation is repeated with it, and so on successively throughout the entire train. As soon as the engine increases its speed, the pressure on A, is relieved, a coiled spring, E, thrusts out the bar, A, to its original position, when the speed of the car to which it is attached increases and throws off the brakes on the car behind it, and so on successively throughout the train. The apparatus acts entirely independent of the buffers, and is simple and strong. It would seem to supply a means for breaking up a train with certainty and rapidity. Patented by Inglis Walker, 7 Congress street, Lynn, Mass., to whom communications may be addressed.



AUTOMATIC CAR BRAKE.

The Fourth Louisiana State Grand Fair.

This Fair will be held in the city of New Orleans, in 1870, commencing on Saturday the 23d day of April, and will continue nine days. The aim of the directors, is to afford facilities for the display of all products of industry and ingenuity, and they express the determination to make this fair as popular as any ever held in this country.

Those who are desirous of giving special premiums, must notify the Secretary, Luther Homes, Esq., office of Mechanics Institute, New Orleans, as soon as possible, and not later than the 1st day of November, 1869, so that their names and premiums offered may be published in the premium catalogue which is to be printed and ready for distribution by the 1st day of December next. This exhibition will doubtless be one at which a large proportion of American industry will be represented.

Fig. 2

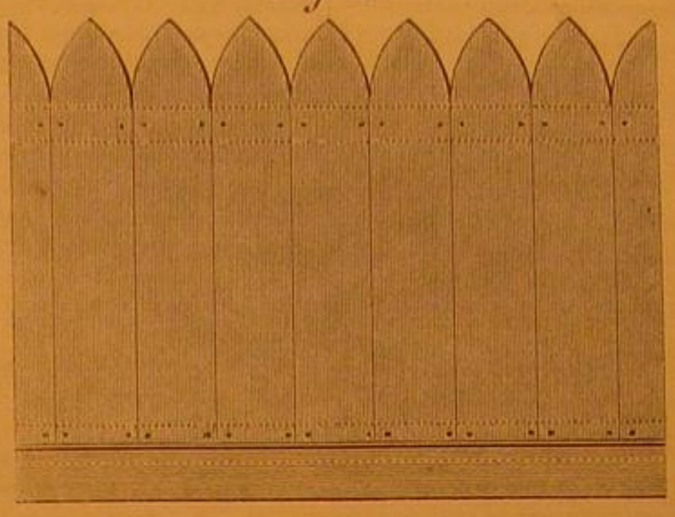
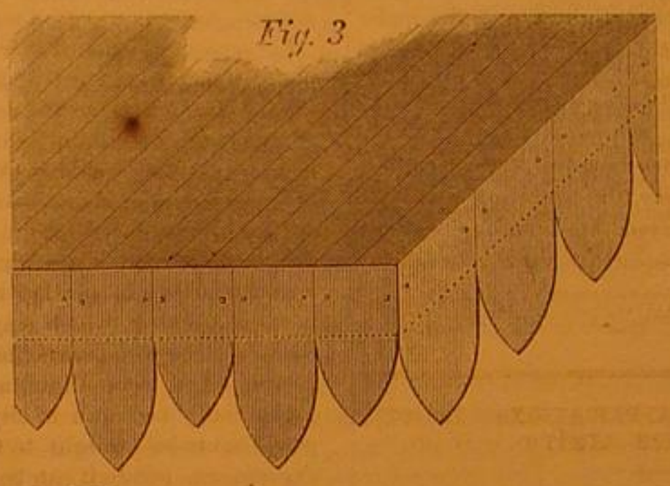


Fig. 3



Exeter-Change.--A Spice of English Humor.

Exeter Change is the name of a humorous take-off on the British Association which meets this year at Exeter. As the scientific journals and the *savans* take the joke in good part and are enjoying a general side-shaking over the many capital hits made, we may as well also enjoy our quiet laugh over the following extract from a paper "On the Alcoholic Compound termed Punch," by John T—n d—ll, LL.D., F, R. S.—It has a capital imitation of the style of a certain eminent lecturer and physicist. Let us content ourselves with the last two paragraphs—

"Experiment has proved that the juice of three or four lemons, and three quarters of a pound of loaf-sugar dissolved in about three pints of boiling water, give saporous waves which strike the palate at such intervals that the thrilling acidity of the lemon-juice and the cloying sweetness of the sugar are no longer distinguishable. We have, in fact, a harmony of saporific notes. The pitch, however, is too low, and to highten it, we infuse in the boiling water the fragrant yellow rind of one lemon. Here we might pause, if the soul of man craved no higher result than lemonade. But to obtain the culminating saporosity of punch, we must dash into the bowl, at least, a pint of rum and nearly the same volume of brandy. The molecules of alcohol, sugar, and citric acid collide, and an entirely new series of vibrations are produced—tremors to which the dullest palate is attuned.

"In Punch, then, we have rhythm within rhythm, and all that philosophy can do is to take kindly to its subtile harmonies. It will depend in some measure upon previous habits whether the punch when mixed will be taken in excess or in moderation. It may become a dangerous ally of gravity and bring a sentient being to the gutter. But, on the other hand, it may become the potent inner stimulus of a noble outward life."

Steel.

A piece of good steel is an almost priceless treasure, because tools are an indispensable requirement. Yet make steel as carefully as possible, you cannot always rely upon its uniform quality throughout the same piece. Outer indications are often unreliable, and even breakage revelations refer but to the point of fracture. In forging steel the secret is the temperature. Too high or too low will ruin all; and this temperature must vary with the kind of steel required. Therefore cheapness should never be sought as the chief good. Blistered and shear steel want more heat than cast steel; the greater the amount of carbon, the lower must be the heat at working, and yet the harder is the labor. Good forging is as important as good material. After cooling, the hammering should be very light, or internal fracture will be set up, not homogeneity. Let the blows fall in one direction; certainly not at right angles to each other, so as to destroy the grain. Burned steel may be brought round by heating hot and quenching in water repeatedly. In tempering, great care is needed. Forging tempers, and a less heat will then suffice. This hammering is better as a commencement, than hardening direct from the annealing oven.

At the International Pharmaceutical Congress, to be held in Vienna in September, one of the topics for discussion will be the formation of a universal *Pharmacopœia*; the object being to put an end to the inconveniences which sometimes arise from compounding prescriptions in a foreign country with medicines prepared according to a *Pharmacopœia* different from that in use in the country of the physician by whom the prescription was written.

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HAVE THE MECHANICAL APPLICATIONS OF STEEL REACHED THEIR LIMIT?

The great number of the useful applications of steel in the arts, which characterize the present age, have given to it the appropriate title of the "Age of Steel." It has been commonly predicted that the number of uses to which this metal can be put will be largely extended, and that iron will eventually give place to steel on railways, in bridge construction, and in many other important applications.

Sir William Armstrong in his recent address to the mechanical engineers at Newcastle, made some statements upon this subject that will attract the attention of the mechanical world, and will not probably pass unquestioned by those who are perhaps not less authorities on the subject than even Sir William Armstrong himself.

The conclusion at which he arrives is, to use his own language, "that although steel has a much greater tensile strength than wrought iron, it is less adapted to resist concussive strain." This conclusion is based upon the assertion that "the vibratory action attending excessive concussion, is more dangerous to steel than to iron," and also upon "the want of uniformity in steel, which still continues to be an objection to its use."

It must be admitted that these views were supported with much ability. The speaker alluded to experiments made by him some years since, on the toughening of steel in large masses by plunging it, when heated, in oil, from which he was led to expect that he would be able to produce armor plates of extraordinary resisting power. An armor plate of steel was made specially for the experiments, and was tempered in a large bath of oil. Its quality was then tested by cutting off pieces, bending and subjecting them to tension. The speaker asserted that although the result showed a very high tensile strength, combined with so much toughness that he was unable to match it by any sample of iron he could compare with it, yet when the plate was sent to Portsmouth for trial in the fullest confidence of its success, two shots from a 68 pounder sufficed to break it in various directions, and it was justly pronounced a failure.

Here then we are presented with an anomaly. The best and only tests which are available to the iron master, in order to prove the strength of iron and steel, having demonstrated the great strength and tensile power of the steel in the armor plate described, it utterly failed under a trial that an iron plate of similar dimensions would undoubtedly have withstood.

Now, whatever plea may be made against the validity of the preliminary test, will not avail to controvert the fact that steel is not understood, and in that fact we find, if not the proof that Sir William Armstrong is wrong in opinion in regard to the limit of the availability of steel, at least the ground for the hope that he may not be right.

There are yet unpenetrated mysteries in the nature of this wonderful material, which, notwithstanding the unremitting efforts of investigators, still elude their grasp. Even the nature of the common process of tempering is, as yet, a matter of theoretical discussion, about which absolutely nothing is known positively. To entertain the belief which Sir William Armstrong avows, and in which he is partially backed by *The Engineer*, is to entertain the unwelcome idea that the limit of knowledge in this field is reached.

The mind of most scientists would shrink from such a conclusion; the progress made in the manufacture of steel within the last decade forbids it; and the name and fame of the man who thus avows it, will fail to add weight enough to his views to lead to their extensive adoption.

WOOD AND CONCRETE PAVEMENTS.

That the days of the barbarous cobble-stone pavements, and of all other roadways approximating to them in character, are numbered, must, we think, be evident to every careful observer. This is an age of progress, but it is an age which favors smooth and rapid progress, and is intolerant of jolting and jarring. It has sickened of the intolerable nuisance of stone blocks and cobbles, and now demands something that will exact less of man and beast and vehicle, and it will get what it wants by and by.

The construction of good and durable roads is no easy problem, especially in a climate like ours, where giant frosts annually get under the surface and upheave it, unless some adequate means can be devised to prevent them. To dig down below the reach of frost, and carry up a solid structure to the surface as in a foundation for a building, would, of course, do away with this difficulty; but it introduces another, even worse—enormous expense.

The problem may, perhaps, be stated as follows: Required to make a roadway impermeable to water (which alone renders the action of frost destructive to roads), and at the same time sufficiently thick and strong to withstand the heaviest traffic for a reasonable period of time; smooth on its upper surface, but not so hard as to fail to afford good footing for horses; and *cheap*. But cheapness does not by any means mean small outlay in the first instance. A road costing four dollars per square yard at first, and having the capability to endure for twelve years, is cheaper than one costing two dollars, and lasting only three years. And a road that will transfer a great proportion of the wear and tear from beasts of burden and vehicles to itself, may wear out rapidly and still be a very cheap road.

There are also some minor requisites for roads in cities, such as facility in getting up and repairing gas and water-pipes and sewers, which may not be disregarded.

In no field of construction, perhaps, can mere theorizing be less relied upon than in the improvement of our roads, proverbially bad both in city and country. Everything proposed must be brought to the test of actual and prolonged experiment, before it can be pronounced either good or bad. Hence it is impossible at present to pronounce intelligently upon the merits of many new claimants upon public favor. And in the cases of many of those which have been for some time under trial, it is equally difficult to decide, as the circumstances under which they were tested have been in many cases the worst possible, and in no manner of accordance with the intentions of their originators.

Thus the *American Builder* informs us that "The manner in which the wooden pavements are being put down this season in Chicago is enough to make the dead inventor of the Nicolson pavement laugh in his coffin. Indeed it is a ghastly joke. To avoid paying an honest and just royalty, the city authorities are compelling the sorely taxed people to throw their money away."

The Nicolson pavement, if not the most durable, is certainly the most agreeable of roads, but we insist that in very few instances have its promoters been able to secure for it anything like a fair chance. Its durability depends upon the manner in which the work of laying is performed perhaps more than any other pavement possessing equal merit, and so long as the work is performed as the *Builder* states it is now being done in Chicago, there will not be lack of those who will saddle the shortcomings of contractors upon the character of the pavement.

We are informed by one of the promoters of the Nicolson pavement, that an important improvement has been made in the method of constructing it. It originated with Mr. De Golyer, of Chicago, we believe, and consists of replacing the wooden pickets hitherto used to separate rows of the blocks, with a layer of concrete rammed as hard as possible. This supports the blocks laterally in a much more efficient manner than was attainable by the old method, and greatly adds to the durability of the pavement.

We believe that experiment will ultimately lead to the construction of concrete roads which will answer all the requisite conditions.

In fact, some statements made in regard to the Scrimshaw pavement, if they are to be relied upon, would seem to give hope that this ultimatum has already been reached. We are informed that this pavement has been tried in Portland, Maine, on a piece of road exposed to very severe wear from heavy trucks used to carry large blocks of granite, and has stood the test of wear and weather for eight years.

This pavement is now being put down on Bedford avenue, in Brooklyn, and also in Fifth avenue, New York. It consists, first, of a foundation of stone laid like the cobble or block pavements. The earth and sand being carefully swept from the interstices of these stones, a layer of gravel and asphalt mixed with coal ashes is spread over the surface, and the whole rolled down with heavy rollers. Successive coats of fine gravel, asphalt, and coal ashes complete the work. Each coat is heavily rolled down as applied; and the road when finished has an elegant appearance, and is delightful to drive over.

The method of laying the concrete upon the old pavement without previously relaying it, is, we think, not likely to prove so efficient as when the stones are relaid, although on account of diminished expense it is done in some instances.

Per contra to the above favorable statements in regard to the Scrimshaw pavement, we hear rumors of unsatisfactory results in Montague street, Brooklyn, where it has been recently laid, and some assert that no such results as the above, given on the authority of the committee, appointed to investigate the merits of the Scrimshaw pavement previous to its adoption in Bedford avenue, can be realized.

Without crediting or discrediting the statements put forth in regard to this pavement, we shall patiently await the result of the experiments now in progress and, while we yet prefer the Nicolson pavement when properly and honestly laid, to any road we have yet seen, that does not prevent us from hoping and expecting something which will prove an advance on anything yet devised for American roads.

RAILWAY CONSOLIDATION.

Our able and spirited cotemporary, the Philadelphia *Public Ledger*, in a recent issue discussed this subject in a manner which leads us to believe that it not only anticipates rapid and extensive consolidation of various railroad interests in this country, but that it favors such consolidation under the plea that it would prove beneficial to the country at large.

It sees in the struggle, now taking place between rival lines, the indications that the big fish are to eat up the little ones, and, in an able review of the various railway routes of the country, comes to the conclusion that in this process the traveling and commercial public will be great gainers, even though the little fish suffer. It says: "By thus consolidating the companies, the expense and the evils of a variety of managing boards will be avoided, and the public will have greater regularity, less changing of cars, and uniform rates of fares. There will probably be sufficient competition between the great companies to insure the transportation of goods and passengers at reasonable rates."

Now we not only feel some pangs of pity for the little fish, whose bones are so complacently crunched by the remorseless jaws of more powerful monsters, but also some fears that when the supply of minnows falls short, the public may itself become the food of fat railroad sharks, whose hunger seems to be of that chronic kind which no amount of stuffing can allay.

It seems to us that the *Ledger* entirely ignores the great power of combination, or the plainly-indicated will of large capitalists to combine whenever there is money to be made by it. Though the railway kings of the present are, some of them, fighting among themselves with a bitterness which, to the outside observer, might seem irreconcilable, let them see how some millions might flow into their coffers by united movement, and you shall see them to-morrow as loving as brothers. So well is this understood on Wall street that in the last great Erie fight no one would have been surprised at a *denouement* which would have exhibited the principal contestants as partners in some deep game for the mutual interests of both.

It is difficult to see how the reduction of the number of rival interests could reduce competition, as the *Ledger* seems to think it would. This view seems to us as altogether opposed to both experience and the general law of supply and demand. How has it been with the great express companies? Has competition reduced their rates or has combination enabled them to maintain prices at a high standard? We do not at present see how such combinations can be prevented; but, at the same time, we are far from deeming them desirable. With the facilities afforded for manipulation by our present railway system, almost anything surprising seems to be possible, if not probable. It is a very difficult thing to see how a repetition of the extraordinary transactions which have within the last two years so astounded the world can be prevented at any time the "kings" again will it, unless some means can be devised to prevent consolidation. Let these men once secure full control of the great trunk lines and their tributaries, and with it the power to enforce their demands upon the commerce of the country, and who doubts that those demands would be despotically exorbitant?

GRANTS versus PATENTS.

We believe it was proposed recently, by Lord Stanley, to substitute grants from the national purse, instead of allowing patents for new and meritorious inventions. His lordship appears to have forgotten the fact that this system of grants was tried a century ago in England and abandoned. It encouraged imposture and gave no advantage to the public, as can be shown by reference to some examples. One Johanna Stevens obtained $25,000 for disclosing the secret of her cure for the stone. A Mr. Blake got $12,500 to assist him in perfecting his scheme for transporting fish to London by land; while a Mr. Foden was greatly overpaid with $2,500, to enable him to prosecute a discovery made by him of a paste as a substitute for wheat flour. If we mistake not, the British Parliament granted a considerable sum of money to pay Lady Webster for divulging the secret of her celebrated dinner pills, which were made up of aloes, mastic, red roses, and sirup of wormwood. The pills, perhaps, afforded a very comfortable relief to aristocratic gourmands, who, no doubt, were astonished to find of what simple elements they were composed.

Give a man a sum of money for his invention and you run the risk of paying him either too much or too little. Give him a patent and you secure the invention for the public, while his remuneration in money is determined according to its value. If the invention enrich him, it must also have benefited the nation. If the invention be a delusion, the public suffers no loss and the patentee reaps no gain. As a means for providing that the reward shall be fairly apportioned to

the service rendered, and shall be paid by those who profit by it, the grant of Letters Patent takes precedence of any arrangement hitherto made, and of every proposition yet advanced.

WHAT IS MATTER?

The author of "More Light: A Dream in Science," has published a treatise purporting to answer that, in our opinion, never-to-be-humanly-answered question, "What is Matter?" We have always denounced speculation upon topics which we believe to lie beyond the boundary of physical inquiry; believing that scientific methods cannot be applied to such investigation, if that may be called investigation, which is nothing more than either conjecturing what may be the causes of existing facts, or deducing a system from a basis of conjecture. Such speculations are generally a patchwork of guesses, with new names for old facts, which only transfer the mystery surrounding the ultimate causes of things.

The best illustrations of this statement we could possibly give are some short quotations from the work in question.

The universe is filled with centers of force; each center the center sphere; each sphere a compound of two spheres, having the same center, one a sphere of attraction, the other a sphere of repulsion.

* * * * *

It is by the separation of these two spheres of attraction and repulsion, and therefore by the calling forth and exercise of their powers by each, that we have the different modifications of matter.

The Divine Mind caused a certain immense, but yet finite, portion of space to be marked off from His immediate presence as a center—a great sphere—of space. This, by some manifestation of His power and presence, was filled with centers of force, the seeds, as it were, of that which was to be known as matter, round each of which two forces, attraction and repulsion, were in abeyance.

If the reader is not disgusted with the absurd and visionary character of these propositions, he will perhaps be interested in their analysis. The propositions may be thus restated. *Matter is force. Force has a Divine origin.* The latter proposition may be considered as foreign to the purpose of the work, which is to tell us what matter is, not from whence it originated.

But somehow the idea that matter is force does not seem satisfactory. We do not get a very good notion of it by calling it force, a term which is as mysterious as was matter before our author had poured upon it the brilliant light of his powerful intellect.

He would doubtless tell us were we to ask "What is force?" that force is—is—in fact—is matter, which would be perfectly intelligible and satisfactory. We should then have got to the ultimatum, and further inquiry would be superfluous.

We are not surprised at the severe lashing this book has received from the reviewers. Dreamers in science are out of place in the present age. The world does not need or want them. Dreaming and speculation are not just now in favor. There is too much work to do, to waste time and thought in such futile occupations.

DIVERSITY OF SPRINGS AT SARATOGA---NEW DISCOVERIES.

The visitor for the first time at Saratoga invariably expresses surprise at the great number of springs he finds there, and the variety of mineral ingredients analysis shows the waters of the different springs to contain. For many years waters from the Congress and Empire springs have been very widely known for their medicinal qualities, and an extensive business in bottling and shipping to all parts of the world has been profitably carried on. But how few, except visitors at Saratoga, have ever heard of the score and more of other springs within a radius of two miles, each possessing chemical ingredients in every case, varied in quantity, and generally very unlike in quality. Within a few yards of each other one spring produces a cathartic water, and the other gives a water having astringent properties. In the first no iron can be detected by chemical analysis, in the other particles of the oxide are seen by the naked eye. Every year new discoveries are made and new springs developed. Last year quite a sensation was produced by the discovery of a sulphur spring, and a commodious bathing house, erected after last season closed, has been extensively patronized this year. In removing some rubbish on the site of a barn, which was burnt last summer near Congress Hall, a new spring was discovered, which has been named "Hathorn Spring," after the proprietor of the hotel, by whom it is owned. It has been a favorite water this summer, and is believed by many to be the best cathartic spring yet discovered.

Mr. C. R. Brown, the enterprising jeweler on Broadway, opposite the Congress Spring grounds, has recently discovered a spring which he has named "Crystal Spring," on a valuable plot of ground he recently purchased, between his store and the Columbian Hotel, which he is about to have tested, and by next season the public will be invited to try its medicinal merits.

An analysis has just been made by Prof. Chandler, of the School of Mines in this city, and his report indicates the water to contain some valuable properties not to be found in like proportions in any of the many other springs at Saratoga.

The spring is located in a most central position, within a few feet of Broadway, and is more accessible to most of the hotel visitors than even the Congress. We hope the owner's sanguine expectations as to the value of his newly-acquired possession may be fully realized, and from its location and the analysis of the water, we have no doubt of the great value of the property. A stock company will probably be formed before many months for carrying on the business of bottling on an extensive scale. Any one desiring an analysis of either of the new springs can procure printed copies by inclosing ten cents and addressing Mr. Huling, office *Saratogian*, Saratoga Springs, N. Y.

HINTS ON THE BURNING OF ANTHRACITE COAL.

The burning of anthracite coal requires appliances quite different from those used for the burning of wood, or bituminous coal, but the reasons for these differences, are not well understood by the mass of people who use anthracite, and as we are constantly receiving inquiries suggested by imperfections in the construction of stoves, furnaces, and heaters, we deem it timely to give some hints on this subject.

In doing this we shall necessarily be obliged to repeat in substance much that we have said in former seasons upon the same and kindred subjects, but the importance and practical nature of the topic must be our excuse.

The temperatures at which different kinds of fuel ignite, vary greatly, and as anthracite is the most difficult to kindle of all the fuels in use in this country, novices in its use often find trouble in lighting it. This can only be done by the use of some more easily kindled fuel, wood or charcoal being generally employed for the purpose. Anthracite coal being a much more dense material than the other fuels named, requires a concentrated and powerful heat to raise it to the temperature at which it will commence to combine with the oxygen of the air. A common fault with those unaccustomed to it, is to use too coarse wood for kindling, and too much of it. This, while it generally succeeds in lighting the coal, leaves a bed of ashes below the coal which interferes with the draft unless raked out; an operation which always retards the combustion of partially ignited coal.

The wood should be of some rapidly burning variety which gives a quick and high heat, and should be split fine. It should be so placed that the coal will remain on the top of it and not fall through to the grate, leaving the kindling on the top of any part of the coal. The amount of kindling wood required depends much upon the size of the coal. A common mistake is to use too large sized coal. A good rule, where stoves or furnaces have a good draft, is to use coal as small as can be used without inconvenience from its sifting too freely through the grate.

Grates should have their bars closely set for stoves that are cleaned out daily, and have fires lighted in them each morning, while those which are intended to have fire kept in them continuously for days or weeks will not admit of fine grates, on account of the accumulation of ashes and small "clinkers."

There is much difference in coal in regard to the formation of clinkers. These are nothing but vitrified, or partially vitrified earthy matters, and only can form when a high heat is maintained; they are apt to be troublesome when there is too great draft. A coal stove or furnace should therefore be so constructed that its draft can be perfectly controlled. The bottom draft should admit of being closed air tight, as nearly as is possible to make it, and there ought always to be provision made for a top draft. If, however, the draft of a chimney should be so strong, that air in too great quantities is drawn in at the bottom when the dampers are closed, a damper in the pipe which will close it partially must be employed, though in sluggish chimneys such a damper is apt to force the gases of combustion into the room, and therefore it ought always to be avoided when possible.

The practice of putting ashes on the top of a fire to keep it, is very productive of clinkers, although it answers the purpose very well in other respects. Damp coal screenings are better, and may be economically burned in this manner.

If a coal fire gets very low, the quickest way to extinguish it, is to rake it at the bottom. To preserve a fire under such circumstances, a little coal should be placed on the fire, and when it has caught more may be added, and the raking deferred until it has got well ignited.

When the fire bricks have become burdened with clinkers which have fused and adhered, they may be cleaned by throwing oyster or clam shells into the fire box when the fire is very hot, and allowing the fire to go out. The clinkers will generally cleave off without the use of much force the next morning. From two quarts to one-half a peck, will be sufficient for most stoves, and the operation can be repeated if some of the clinkers still adhere.

In a subsequent article we shall say something on the proper regulation and adjustment of apparatus for warming buildings by hot air

GAS FROM THE LIGHT HYDROCARBONS.

We notice a description of a new(?) gas machine in the *Mechanics' Magazine*, of Aug. 6. This machine is described as being of any size desired, within certain limits, and the journal alluded to, considers it as an improvement upon anything hitherto known or employed in this direction.

Some of our American inventors will have a hearty laugh over this, when they read the description of the apparatus, the principle of which has been unsuccessfully tried over and over again in this country, in various forms, including the one described. The machine is stated to be "cylindrical in form, having a space between an inner cylinder which receives the charge of rock oil and the outer case. From the charge cylinder the oil exudes slowly into the space referred to, at the bottom of which it is absorbed by a layer of wool. The vapor rising from this oil in the saturated wool furnishes the essential element in the gas to be produced; the only other element is atmospheric air, with which the vapor is diluted. The air, which is only introduced into the machine when the consumption of gas is going on, is regulated in its admission by a piece of machinery actuated by a spring barrel movement, similar to that of a spring timepiece. The pump, which admits the atmospheric air, and the machinery with which it is connected, are put in motion as soon as gas begins to be drawn off, and the process of manufacturing the gas, the mixture simply of the atmospheric air with the vapor of the oil, at once commences and continues self-acting, as long as the charge of oil lasts, and gas continues to be drawn off. The process is beautifully simple, the gas being made instantaneously, without the application of heat, or any labor or attention whatever."

That the action of this machine is a repetition of the experience of many American inventors is evident from the following quotation from the journal referred to.

"The gas, as we saw it produced, was not very brilliant, but experience as to the qualities of the oils used, and practice in the use of the machine, will probably lead to the production of as high a quality as can be desired. According to the inventor's statement, a gallon of oil at 2s. 6d. will produce 1,000 cubic feet of fifteen-candle gas, and a charge of 3½ gallons will burn for 750 hours through an argand burner. The apparatus is adapted for use in houses, shops, theaters, churches, or other public buildings."

It might have been added, that its adaptation to the above purposes yet remains to be demonstrated, and we can promise, that when the oil becomes impoverished by the evaporation of its more volatile portions, or when its volatile character is decreased by a low temperature, the light will be still less brilliant than when exhibited to the editor of the *Mechanics' Magazine*.

Such experiments have had their day in this country, and it is well understood, that the principle upon which they are based is wholly inadequate. Eight years ago we experimented with and tested a large number of similar devices. The results of our investigations were the following conclusions. First, only the lightest of the hydrocarbons will volatilize at, say, 50 degrees, with sufficient rapidity to supply even a few burners with air saturated with hydrocarbon vapor in the proper proportions for illuminating purposes. Second, the oils, even if sufficiently light at first, rapidly become heavier by the consumption of their more volatile constituents, so that only a small proportion can be consumed ere the light begins to deteriorate. Third, if heat be applied to any machine of this construction, even admitting the safety of such an application, the amount of condensation in the service pipes will soon generate a train of evils well known to those who have been "through the mill," and which it is, therefore, unnecessary to specify here.

These difficulties have compelled the abandonment of the principle, and with its renouncement, to the adoption of better plans for utilizing the valuable illuminating properties of the light hydrocarbons.

One of these improvements was recently illustrated and described at length in these columns, and something which shall admit of adjusting the flow of the air to the volume of vapor generated, so that recondensation in pipes can be obviated, will be found an absolute essential to the success of any device for manufacturing gas from the distillates of petroleum.

STARCH AND ITS ADULTERATIONS.

This substance, which is of great importance in the arts, more especially in printing and finishing cotton and linen goods, is often adulterated, and in other respects may be of such a quality as to disappoint the manufacturer. Some inquiries which we have recently received upon this subject will be concisely and fully answered in the following extract from O'Neill's "Dictionary of Dyeing and Calico Printing:

"Starch is a widely-diffused vegetable product; it exists in a vast number of plants, fruits, and trees, and seems to be one of the fundamental bodies of organic life. Its composition is very similar to that of sugar, being a compound of carbon with hydrogen and oxygen, in the proportions requisite to form water. It is extensively used in printing and finishing, but does not in either case exercise any actions of a purely chemical nature; as a thickening it is only a vehicle for conveying the color or the mordant to the fiber; as a finish it is only to give stiffness or fulness to the cloth. But its actions in many cases involve the play of chemical affinities, and should be minutely known. Pure wheaten starch, when closely examined under the microscope, is found to be composed of very small globules. In commerce it is found in a peculiar state of aggregation, incorrectly said to be crystallized; the quality of the starch is often judged and determined by the appearance of these columnar masses called crystals. No other starch but that from wheat takes the same form in drying. It is not prudent, however, to depend too much upon this as a test, for I believe the crystalline character can be communicated to other starches, and that it is not an essential character of wheaten starch, but rather an accidental one, due to a partial decomposition and breaking up of some of the globules, which communicate a gummy nature and adhesive character to the remainder, or to a residue of unremoved glutinous matters. Starch does not dissolve at all in pure water when cold, it mixes up, but then settles down, leaving the liquid clear; it dissolves in hot water, swelling out to a great extent; it begins to dissolve, or the particles to burst, at about 150° F., but color cannot be well thickened at this heat, it must be boiled to get a good result. Starch boiled with acids, or acid liquor, thickens at first but afterwards becomes thin, owing to the destruction of the starch and its conversion into sugar; colors should not, therefore, as a general rule, be boiled until they begin to grow thin again—although in special cases this is prescribed, and is an advantage, but it is usually unnecessary, and likely to injure the color.

"A good wheaten starch is white and clear, has a sweet taste

on the tongue, or at least an absence of bad taste, and, before dissolving in the mouth, shows an adhesiveness to the tongue; when mixed with water it should give a white milky fluid, without any particles of dirt floating on the top, and should settle down quickly, forming a solid hard mass at the bottom of the fluid. As a trial for its thickening powers a quantity may be boiled with water in the usual manner; two proportions should be taken, one thicker than is generally required, and another thinner—for instance, one trial at one pound to the gallon, and both boiled with the usual precautions. The manner in which it behaves on boiling, as well as its appearance when boiled should be observed. A good starch will thicken gradually and evenly throughout, not in lumps; it will keep smooth all the time with only a moderate amount of stirring, and when boiled will be of a clear, transparent, gelatinous appearance—not milky and opaque, nor breaking off short when lifted with a stick. At two pounds per gallon it ought to be pretty stiff while hot, to pour out slowly, and for the most part adhere to the sides of a gallon mug, when this is inverted for a short time; at one pound per gallon it should flow smooth and oily, without appearance of water or breaks in it. When cold, the thick trial should be very stiff, and feel tough and solid in the hand; the skin should be of a tough leathery nature, and no water should be floating about—it will not be so clear as when hot, but still should be partially transparent; the thinner trial should be also of increased consistence, and not show any water; it should be smooth and not containing lumps. There are besides these characters a great number of others, too minute to record, which are combined in forming the opinion as to the quality of a sample of starch. It is a practical question, and nothing but a number of trials, upon all kinds of starches, will enable any one to form a correct opinion upon this matter.

"Starch is sometimes adulterated with mineral substances, as gypsum, sulphate of baryta, or mineral white, China clay, etc. The existence of these substances make a starch boil rough and opaque; they can be discovered by burning some of the starch in a proper manner—if much earthy matter be left as a residue, it will be a sign of adulteration. It is sometimes understood that starch for finishing contains mineral matters, and a proportionable reduction in price is made, but oftener there is only one party cognizant of it; at any rate a starch containing added mineral matter ought not to be used in mixing colors, however good it may be as a finishing starch. Inferior qualities of starch, under the names of seconds, slimes, and hair powder starch, are extensively used in the trade, and may be economically and easily employed in numerous cases; for it is not necessary, in making colors, that a starch as pure as is required for domestic purposes should be used; what is required is a good sound article, free from adulteration, not injured by acids or fermentation, and, if otherwise good, it does not matter whether it be in powder or in crystal, perfect white or a little grayish. Starch is sometimes injured by some of the gluten of the flour being left in it. Such a starch does not keep well, soon goes watery, or putrefies, emitting bad smells. By scattering a little of this kind of starch upon a red hot iron plate the gluten makes itself apparent, by giving off a disagreeable animal smell, like burning woolen, or leather, or the hoofs of horses. This kind of starch has never a good color, and, if in crystals, has a flinty hardness. Good starch does not contain more than ten or fifteen per cent of water; the latter is the largest quantity it should lose in drying, at moderate temperatures."

THE EXHIBITION OF THE AMERICAN INSTITUTE.

The annual exhibition of this association is to be held in the Empire City Skating Rink Building, corner of Sixty-third street and Third Avenue, New York city. The building was opened for the reception of articles and machinery to be exhibited on the 1st September, and is now well stocked with a large variety of things, comprised under the following departments, which will be more fully noticed in subsequent issues of our paper.

1. The Department of Fine Arts and Education, consisting of paintings on canvas, glass, etc., engraving, lithographs, photographs, sculpture, musical instruments, specimens of printing and bookbinding, philosophical instruments, etc.

2. The Department of the Dwelling, comprising apparatus for warming, lighting, cooling and ventilating, cooking stoves, kitchen utensils, carpets, oil cloths, tapestry, cabinet furniture, table furniture, ornaments for parlors, building accessories, mantels, grates, etc.

3. The Department of Dress and Handicraft, including wearing apparel for both sexes, sewing machines, artificial limbs, wigs and hair-work, jewelry, trunks, umbrellas, etc.

4. The Department of Chemistry and Mineralogy—soaps, toilet preparations, acids, leather, furs, india-rubber and gutta-percha preparations, paints, dye stuffs, sugars, confectionery, minerals, ores, apparatus for making gas, natural stones used in building, etc.

5. The Department of Engines and Machinery—machines for making wood, metal, and all tools used by artisans or in factories, not otherwise provided for.

6. The Department of Intercommunication, containing locomotive engines, cars, carriages, wagons, sleighs, models of ocean or river vessels, electric telegraphs, etc.

7. The Department of Agriculture and Horticulture—specimens of plants and flowers, fruits, vegetables, butter, cheese, plows, cultivators, mowers, reapers, churns, cheese presses, hemp, flax, cotton, etc.

Each of the above departments is to be divided into seven groups, articles of like nature being kept together. In addition to this there is the display of the National Association of Wool Manufacturers.

The main building is 350 feet in length by 170 feet in width, giving an area of 59,500 square feet. A new building has been erected at the easterly end of the Rink, 200 feet long by 50 feet wide, for the exhibition of machinery driven by steam. Two engines, of 90-horse power each, furnish the motive power for the machinery on exhibition, among which there are pumps, engines, a file cutter, lathes, planing machines, Merrill's tilt and atmospheric hammer and drop press, spinning machines, steam hammers, a Bullock printing press, Lyall's positive motion loom, and many other of the newest inventions for divers uses. The steam boilers for driving this mass of machinery are located in the rear of the new building. A large blacksmith's forge of new invention is also placed here, and is in constant operation. There are also many minor mechanical improvements on record, which will be noticed more in detail hereafter.

The exhibition is likely to prove a very successful and interesting one, and will doubtless be largely attended.

Editorial Summary.

WARMING CHURCHES BY GAS.—The following method has been patented in England. A brick chamber is made beneath the floor of the building, and a grating is placed over it to allow of the passage of hot air. Beneath this chamber an air flue in connection with the flooring, and covered with an iron grating, is introduced. By these means a current of air is made to pass into the building, and this air is brought into contact with a ring gas burner, which is supplied by an ordinary main by means of a spanner, by which the amount of heat can be regulated. Underneath this ring-burner is placed a small cistern made of fire-clay, filled with water; the heat from the gas burner acts upon the water, steam arises, and this is passed through pumicestone contained in a cylinder above the cistern; the use of this vapor is to moisten the atmosphere contained in the reservoir. Around this is a circular cylinder made of fire-clay, to contain heat. The whole is covered with a dome of fire-clay. This dome is worked by a lever for the purpose of lighting the ring-burner. By these arrangements, it is said that a pure heat, free from smell or smoke, is obtained, and that with a very small consumption of gas.

A NOVEL NUT CRACKER.—Two inventors in England have taken out a patent for cracking palm nuts, in order to remove the shell previously to submitting the kernels to the action of the press for extracting the oil; but it may also be used for the purpose of cracking any other kind of nuts that are required to be cracked in large quantities. A revolving fan is used for producing a blast of air which throws the nut with sufficient force against an iron or metal target to crack them without injuring the kernels. The fan is inclosed in a sheet of iron, or other suitable case, having an entrance passage, provided with a hopper for the introduction of the nuts, and a discharge pipe through which they are driven by a current of air, and discharged against the iron target, by striking which they are broken.

STEAM ENGINEERING AT THE FRENCH EXPOSITION.—We are indebted to the courtesy of William S. Anchincloss, C. E., Honorary Commissioner to the French Exposition of 1867, and author of an able work on "Link and Valve Motions," recently noticed at length in this journal, for a copy of his report on Steam Engineering, as illustrated by the Paris Universal Exposition of 1867. An extract entitled Transmission of Power, published in another column, is one of the many good things we find in this interesting work. It is to be regretted that so limited a number of copies of this report have been published, as the information it contains is of high value to American Engineers. We shall make some other extracts from this valuable report.

TARPAULIN.—A new method for making a durable and useful tarpaulin, consists in boiling gas tar, one hundred, weight, until it becomes hard, and at the same time boiling in a steam-jacketed pot fourteen gallons of Stockholm tar spirit, ten pounds of American resin, and one gallon of resin oil. When these ingredients are completely dissolved, they are mixed together, and in about ten minutes after, two ounces of oil of vitriol are added. This compound is found to preserve tarpaulins, sail cloth, and other fabrics. By the addition of proper pigments it can be made to receive different tints of dark colors, such as reds and browns.

TOOTH BRUSHES.—There has lately been introduced into the market a porous form of vulcanized india-rubber, called india-rubber sponge. It is proposed to substitute this material for bristles in the manufacture of tooth-brushes. A piece of india-rubber sponge is fixed to a handle of bone or ivory, and ridges are formed on the surface of the spongy material. Other brushes are made in a similar manner by fixing spongy-vulcanized india-rubber to a rigid back or handle; or, in some cases, as for horse brushes, a rigid back only is required. In some cases, the spongy india-rubber is checkered or cross-grooved.

POISONING BY CORALLINE.—M. Landrin has reported experiments to the French Academy, tending to show that pure coralline does not exert any poisonous action on the human skin. M. Tardieu rejoins, that the coralline-dyed stockings which he examined, and which did produce such effects, did not contain arsenic, lead, mercury, or other mineral poisons, but he cannot say whether or not the stockings were colored with coralline only. So the question stands in a position of uncertainty as to the real cause of the mischief imputed to this pretty dye.

NEW GAS BURNER.—A new French invention is a gas-burner, the object of which is in part to do away with the flickering of the flame, so as to render the light steady, also to cause a more perfect combustion of the carbon. It consists of a metal piece having several openings, through some of which gas issues, and through the others atmospheric air, which mixes with the gas. It appears to be a modification of the ordinary Bunsen burner.

STEEL FISHING RODS.—It is proposed by an English inventor to make fishing rods of iron, steel, or German silver, instead of pliable wood or cane. He constructs the rods as follows—either in one or several pieces, connecting them together by joints in the usual way or by any other means better adapted for the purpose. He uses either solid or tubular metal with the view to obtaining lightness and flexibility.

NEW PUBLICATIONS.

THE AMERICAN ENTOMOLOGIST, for August, completes the first year and the first volume. It has been admirably conducted, and is worthy of the most extensive support. The present number contains a fine colored plate of the Royal Horned Caterpillar and Moth, life size, together with about twenty other engravings. Commencing with the new volume the work is to be enlarged from 24 to 32 pages, the price remaining the same; namely, $1 a year. Monthly. R. P. Studley & Co., Publishers, St. Louis, Mo.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

The quarry property at Cromwell, Conn., is now valued at $100,000. Three years ago it could be bought for $30,000.

Ground has been broken at Portland, Maine, for the construction of the Portland and Ogdensburgh Railroad.

The Supreme Court of Nevada has decided that the telegraph is a branch of commerce, and, as such, is under the control of Congress.

The navigation regulations of the Suez Canal state that the canal will be open for vessels of all nationalities with a draft of less than 24·6 feet.

The quantity of amber lately found at the Kurische Haff in Eastern Prussia, is said to be so great that the market price of the article has fallen.

The new iron bridge over the Cape Fear river, to connect all the railroad lines centering in Wilmington, North Carolina, was opened on the 28th of August.

The Imperial Insurance Company of London has paid $100,000 losses for the whiskey destroyed at the late Philadelphia First street fire, and will soon pay $200,000 additional.

Illinois is to have a new Capitol at Springfield. The plans, specifications, and estimates of the Commissioners have been officially approved. The cost, exclusive of foundation, is limited to $3,000,000.

The colossal bust of Humboldt, which was modeled by Professor Bläser, has been successfully cast in bronze by Howald, in Brunswick, Germany It is intended for New York and will cost about 17,000 thalers.

The English papers complain of the continued emigration of Cornish miners, which is not caused by want of work, but by the low rate of wages paid them. The men who have left are of the best class of miners.

The exhibition of the Pennsylvania State Agricultural Society is to be held in Harrisburgh, opening on Tuesday, the 28th of September, and continuing until the 1st of October. The premium list amounts to $10,000.

The oil excitement at Parker's Landing and about the mouth of the Clarion river still continues to increase. Twenty-three derricks are up on the Clarion county side, and many more on the Armstrong side of the Allegheny.

It is said that the town of Warren, Jo Daviess county, Illinois, offers a bonus of from $2,000 to $3,000 to any responsible person who will go to that town and erect and run a custom steam grist-mill, which is needed in that place.

The dome of the Invalides at Paris, is at last completed, and presents a magnificent appearance, sparkling with gold. It was gilded for the first time by Louis XIV., for the second time by the first Napoleon in 1806, and now for the third time by Louis Napoleon.

A California paper says that 50,000 tuns of wheat were lying in sacks along the banks of the Sacramento river, in Tehama, Butte, Sutter, Colusa, and Yolo counties, on the 1st of August, and that 60,000 more were to follow, making 110,000 tuns as the yield of five counties.

A crib 300 feet long, being one section of the whole length of 900 feet, to be used in the construction of a wharf at North New York, for the Harlem River and Port Chester Railroad, has been towed to its position. The balance of the crib is progressing rapidly, and a steam dredger is constantly at work deepening.

The present production of the White Pine mines is about $86,000 a week, and for the whole district about $100,000 a week. In a month or two the production will be increased to the rate of six millions a year, and the yield for 1870, it is confidently believed, will reach ten million dollars.

A Chicago paper says that there are over 20,000,000 gallons of water consumed daily in that city. It discusses the estimated future consumption and the limited facilities for supplying the demand, and contends that the lake tunnel will be inadequate to supply the city five years hence.

A heavy snow storm prevailed at the summit of Mount Washington, on Aug. 31. The telegraph wires were broken in several places by the ice, which accumulated to the thickness of two inches, or more. The thermometer stood at 28 deg. The *Times* says it snowed in this city on the 1st of September.

The Ames Works, in Chicopee, Massachusetts, are engaged on the bronze fountain for the Central Park, New York. An immense bronze basin is to be cast, which will rest on sixteen columns. The whole is to be octagonal in shape, and a number of curious jets and streams will be worked into the design at various points.

From the annual report of the Street Superintendent of San Francisco it appears that city has 102 miles of paved streets and 253,823 feet of sewerage. The cost of street work from July 1, 1868, to July 1, 1869, has been in round numbers $1,520,000; and the average cost has been nearly a million a year for ten years past.

The State Line Lode, Nye county, Nevada, according to the report of the United States deputy surveyor, is a gold-bearing vein, composed mainly of ferruginous and friable quartz. In many places the entire vein is so friable and crumbly as to be easily removed with the pick alone. A working test of 600 pounds gave a yield of $175 per tun. The improvements on the mine have cost about $2,000 coin.

The following is said to be an excellent imitation of the jet black China varnish for boots and shoes. Dissolve 10 grms. of shellac and 5 grms. of turpentine in 40 grms. of strong methylated spirits, having previously dissolved 1 grm. of extract of logwood, with some neutral chromate of potassa and sulphate of indigo, in the spirits. The varnish should be kept in well stoppered bottles.

New Haven, Conn., is becoming anxious about its water supply. The water is now pumped into the reservoir by water power, wasting ten millions of gallons each day in pumping two and a half millions. The company propose to put in steam pumps, which will enable them to supply a city of two or three hundred thousand inhabitants.

A Belgian has lately had a steamer of diminutive proportions constructed in England. This craft is twenty-four feet long and six feet wide. Her boiler is about the size of a teakettle, and the engine might be put in the

pocket of a great coat. She is said to be a fine sea boat, and has made two or three trips, running from Cowes to Ostend, with great speed. The owner intends to use this little steamer for coasting on the Belgian coast.

The largest span of any truss bridge in the United States is that of the great bridge across the Ohio river at Louisville, which is destined to connect the Kentucky and Indiana shores. The bridge itself will be, when finished (and the engineer in charge expects to turn over his contract for the building some time in November), one of the most splendid structures of the kind in this or any other country. This last span covers three hundred and seventy feet, and is a marvel of engineering skill.

The Philadelphia *Press* says that the miners' strike is spreading throughout the entire coal regions. At Hazleton, Luzerne county, it has assumed a serious aspect. The strikers are laborers employed by the miners to assist them in loading and removing the coal after it has been blasted. On the 23d Aug. they stopped the pumps in all the mines except those of Pardee and Co., and it is understood that work in this mine is also suspended. The sheriff was called upon, and he proceeded to the mines with a *posse comitatus* with the determination of protecting the engineers.

It is a well-known fact that, when it is desirable to cover metals, especially brass or copper, with a strongly-adhering coating of tin, this is usually effected by boiling the articles to be thus coated with an aqueous fluid, to which is added cream of tartar, crystallized protochloride of tin, and some lumps of pure metallic tin. Dr. Hillier states that, instead of this mixture he uses, with very good success, a solution of 1 part of protochloride of tin in 10 parts of water, to which he next adds a solution of 2 parts of caustic soda in 20 parts of water; the mixture becomes turbid, but this does not affect the tinning operation, which is effected by heating the objects to be tinned in this fluid, care being taken, at the same time, to place in the liquid a piece of perforated block-tin plate, and to stir up the fluid during the tinning, with a rod of zinc.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per line will be charged.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; beside, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisemets at $1·00 a line, under the head of "Business and Personal."

☞ *All reference to back numbers should be by volume and page.*

S. T. D., of Me.—It will take less power to work a force pump having a feed pipe larger than a discharge pipe, where the capacity of the pump is sufficient to supply the full capacity of the discharge. The reasons are, that atmospheric pressure can only force water through a pipe of given size at a given velocity, no matter how fast your pump is worked. If the pump has not capacity to force out water through the discharge pipe beyond the limit of supply through a feed pipe of given size, the feed pipe need not be enlarged; but force pumps, as a rule, work under more than atmospheric pressure, and consequently will discharge water through a pipe faster than the same sized pipe would supply it under atmospheric pressure. The friction is also less in a large feed pipe. Under the circumstances you describe, where the feed water has to be raised 20 feet and forced through an orifice of 1¼ inches, we think the feed pipe ought to be at least 2 inches. The making the feed pipe of a pump too small is a common mistake. The feed water is raised only by atmospheric pressure, 15 pounds, while a much larger pressure is applied to the plunger of the pump. Under such circumstances the water will not be supplied to the pump with sufficient rapidity to meet the demand. If the water in your pump is forced out with great velocity, you may need to employ a still larger feed pipe to obtain satisfactory results.

J. P. D., of La.—The breaking of inferior qualities of glass in in the manner described is not confined to lamp chimneys, although from the many changes in temperature to which they are subjected, it is more frequent with them. The difficulty is in the quality of the glass, both its composition and the annealing, are frequently at fault. The breaking of these chimney glasses is a great annoyance, and it is to be hoped that some inventor will give us yet a lamp that will not require a chimney. The only way to prevent in any measure this breakage, is to anneal the chimneys yourself before using them by heating them very hot and allowing them to cool slowly, but few have appliances to do this efficiently and without risk to the chimneys.

W. C. T., of Ga.—The crystals you send have no value. They are composed of quartz or silica, which is one of the most abundant and hardest of minerals, and is a constituent of many kinds of rocks. Silica does not melt under the blow pipe or dissolve in water. The dark colored mineral appears to be a form of limestone containing iron and other minerals, and is apparently of no value. It is, of course, impossible to state the exact constituents of a mineral specimen without making a careful chemical analysis.

A. R., of N. J.—The question whether a given amount of heat will develop more steam in a given time from boiling water than from water before it boils, is yet undecided. Dr. Ure thinks that boiling favors the escape of steam. We have never seen, however, any experiments, or recorded results of experiments, which are conclusive on this point. Our own opinion is that should any such experiments be tried no difference would be found.

A. R., of Pa.—The notion that a boiler sustains more pressure at the top than the bottom is an absurd mistake. The reverse is true, as in addition to the pressure of the steam above the water, there is the hydraulic pressure of the water on the bottom. As, however, the hight of the water in a boiler is not generally great, there is not much difference. It is not a fact that all boilers burst at the top.

W. F. D., of N. H.—There would be no very material difference in the amount of friction in water flowing through two pipes of the same size and form, one made of cast-iron and the other of cement. A good cement pipe is as cheap as anything we know of equally efficient. Your other inquiry requires a mathematical calculation, for which you should apply to an hydraulic engineer inclosing five dollars.

J. O. L., of Ill.—We do not know enough of the device you describe to say whether it contains any points of novelty. The idea of propelling a wind wheel by upward currents through a chimney stack is not by any means new, but the method of doing it in this case may be. There is no doubt that a considerable power might be obtained in this way in a tall chimney, but it would be at the expense of the draft.

T. P., of La.—The species of silk worm you ask about, the natural food of which is the foliage of the oak, imported to the southern part of Austria and France from Japan, have not, to our knowledge, ever been brought to this country. Should any of our correspondents happen to know of a trial of this species in the United States, we should be happy to hear from him.

F. K. H., of Ohio.—To make the finest piano finish on walnut chestnut, or other open and coarse-grained woods, it is usual to use a coarse kind of varnish called scraping varnish. A heavy coat of this is laid on the raw wood, and then the surface is scraped with steel scrapers. It is then varnished with a better quality of varnish, rubbed down perfectly smooth with pumice stone, and finally flowed with the best kind of varnish.

E. P. A., of S. C.—The advantages of the hydrostatic press over all others known for certain kinds of work, are enormous power in small compass, with less friction and perfect control, both as to the extent of motion in the platen and the amount of power applied. Your device is not new in principle. A patent would not be granted for it.

C. W. C., of Pa.—The circumstances which compel the removal of your chimney stack so far away from the furnaces are unfortunate, as they will compel you to run your chimney up higher to get the proper draft. We should think thirty feet additional hight would not more than fully compensate for the difference in position.

W. H. C., of N. Y.—Simply exhausting a receiver by means of an air pump, can never give any pressure upon its exterior greater than it sustains at all times, both before and after exhaustion. It simply removes atmospheric pressure from the interior.

S. T. B., of Ga.—One of the minerals you send appears to be a soft conglomerate of quartz and feldspar, of no value. We find gold in the other specimen, and it appears to be gold-bearing quartz which may be valuable. You should have it analyzed.

J. W. C., of Mich.—You can not profitably extract the sugar from cream sirups which have soured.—The cost of binding the SCIENTIFIC AMERICAN in this city is $1·50 per volume.

"Pioneer Maggie."—A correspondent wishes to know the name of the builder of the above-named yacht. We do not know, but Henry Steers, of this city, builds first-class yachts.

W. S. P., of Mass.—The origin of yeast is obscure, like the origin of every other existence. Assuming the existence of a first cause, we maintain that it is not a subject for physical inquiry. Somewhere the mind must stop at a cause uncaused, a subject for faith not demonstration.

E. G. F., of Me.—The crank is to be regarded as a lever only, the fulcrum being the center of the axle, and the resistance being applied at the circumference of the axle, the point of application of the power being the center of the crank-wrist.

Inventions Patented in England by Americans.

[Compiled from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

2,350.—NUMBERING REGISTER.—G. Sickels and J. H. Thorndike, Boston, Mass. August 6, 1869.

HOLDERS FOR THE CHIMNEYS OF GAS BURNERS.—Elliott P. Gleason, New York city. August 6, 1869.

2,378.—MEANS FOR CARRYING OR STORING EGGS.—P. P. Josef, Buffalo, N. Y. August 9, 1869.

2,392.—ADDING APPARATUS.—C. Henry Webb, New York city. August 9, 1869.

2,402.—TREATMENT OF CONGLOMERATES OF CAST IRON, ETC.—T. S. Blair, Pittsburgh, Pa. August 10, 1869.

2,416.—MACHINERY FOR CHARGING GAS RETORTS.—N. O. J. Tinsdale, New Orleans, La. August 12, 1869.

2,425.—EXTRACTING COPPER FROM ITS ORES.—T. S. Hunt, Montreal, and J. Douglas, Jr., Quebec, Canada. August 13, 1869.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

VALVE GEAR FOR STEAM ENGINES.—Charles L. Inslee, New York city, and Wm. H. Inslee, Newark, N. J.—This invention relates to new and useful improvements in valves, ports, and operating devices, whereby it is designed to provide a simple and cheap plan of construction, and a more efficient arrangement of the same for operation, than any now in use. The invention consists in an improved arrangement of steam chest passages and pipes, steam and exhaust balance valves, and operating devices.

TRANSPORTATION CASE FOR PACKING CANS.—Edwin Norton, Toledo, Ohio.—The object of this invention is to provide an improved packing case for the protection of tin shipping cans, such as are used for shipping oil and other substances, and are sent back and forth, both filled and empty, and are thus subjected to damage from careless handling and other causes. The invention consists in a packing case made of wood, or other suitable substance, permanently inclosing the can, and provided with a sectional lid, cover, or door, arranged to open a sufficient space only at the nozzle, to permit of readily filling or emptying the can, the said cover or door, being arranged at any position in the case, to coincide with the nozzle of the can.

IRON MANUFACTURING APPARATUS.—John Coyne, Allegheny City, Pa.—This apparatus consists of a circular carriage arranged to revolve on a circular table, in a horizontal plane, and provided with receiving and discharging molds, which move slowly past the tap of the furnace, and receive the molten metal flowing therefrom, and convey it to the place of discharging as it cools, and from which it is discharged by the dumping of the molds by the attendant.

SHAFT AND POLE HOLDER.—James S. Totten, Lebanon, Ohio.—This invention comprises the application of holding straps of any form or arrangement, when adapted for ready attachment, to the spring bars and shaft cross bars, by buttons connecting the one, and by buckling or looping around the other.

HOSE-PIPE NOZZLE.—Archibald Williscroft, Wilmington, Del.—This invention has for its object to furnish an improved nozzle for hose pipes, which shall be so constructed and arranged that it may be easily and quickly adjusted to throw a larger or smaller stream of water as may be desired.

MILL BURR.—George W. Wilson, Tolono, Ill.—This invention has for its object to enable the burrs of mills to be conveniently and easily balanced to a perfect standing, or running balance, by means of a device simple in construction and easily applied and adjusted.

PEAT MOLD.—Kingston Goddard, Richmond, N.Y.—This invention has for its object to furnish an improved mold for pressing wet peat into bricks or blocks for fuel, which shall be so constructed as to allow the water to escape while retaining the fine particles of the peat.

PLOW.—Edward Wiard, Louisville, Ky.—This invention has for its object to improve the construction of wrought iron, steel, and cast-iron plows, so as to make them simpler in construction and more efficient in use.

PLOW.—Edward Wiard, Louisville, Ky.—This invention has for its object to furnish an improved plow, which shall be so constructed and arranged that various kinds of plow plates may be used with it, according to the particular kind of plowing required to be done.

MANUFACTURE OF ILLUMINATING GAS.—Cleaveland F. Dunderdale, New York city.—This invention relates to a new and important improvement in manufacturing gas for illuminating purposes.

PUDDLING FURNACE.—J. B. Robinson, Duncansville, Pa.—This invention relates to new and important improvements in puddling or boiling furnaces, whereby they are rendered much more durable and more easily managed than such furnaces has hitherto been.

WHEEL HUB.—A. S. Woodward, Pepperell, Mass.—This invention relates to a new and useful improvement in metallic hubs for carriage, wagon, and other wheels, and consists in forming a hollow or shell hub cast in a single piece.

BAG HOLDER.—J. N. Collins, Menasha, Wis.—This invention relates to a new and useful improvement in the method of holding bags for filling with grain or other articles.

DIRECT IRON-PRODUCING FURNACE.—William Griffith, Jr., Pottsville, Pa.—This invention relates to a new furnace for reducing and producing iron directly from the ore by a continuous operation, and has for its object to reduce the expense of, and to economize time during the operation. The invention consists chiefly in arranging a deoxidizing chamber above the welding or puddling furnace, said chamber being heated by the gases that escape from the fire in the said furnace.

PIN CATCH FOR BREASTPINS AND SIMILAR ARTICLES.—Samuel Ayres, Danville, Ky.—This invention has for its object to so construct breastpins and other similar articles, such as badges, etc., that they can be secured to garments by means of an ordinary pin, in a secure manner, and with great convenience.

REVOLVING SPRING GUN.—Charles Bunge, Geneva, N.Y.—This invention relates to a new spring air-gun, which is so constructed that it can be readily set to automatically place a charge into the barrel, or at least in line with the same; it being provided with a reservoir which contains a suitable large number of charges. The invention consists chiefly in the combination of a perforated revolving feed plate with a stationary supply or reservoir chamber, from which, as the feed plate is turned, the balls constituting the charges, are transferred into the apertures of the feed plate.

SPINNING FRAME.—Wm. H. Brothers, Winooski, Vt.—This invention relates to a new spinning jack, which is so arranged that the mule or carriage will receive its motion by automatic machinery, without requiring any personal attention of the operator or attendant. The object of the invention is to do away with the necessity of working the shipper bar for reversing the motion of the mule, and to provide automatic means for changing the motion. The invention consists in the construction of devices for changing and reversing the motion of the mule for imparting to the thread the necessary drawing and twisting motion, and the requisite tension while twisting, and for operating the whole mechanism.

PRINTING TELEGRAPH MACHINE.—Charles T. Moore, White Sulphur Springs, West Va.—This invention consists of a set of sending apparatus, a set of receiving operating apparatus, and a set of apparatus for "calling" the office or station to which the message is to be sent, all conveniently arranged upon a stand, and adapted to work in conjunction with similar machines at all the stations, and capable of communicating with all the stations simultaneously, or with only one, as required.

PLANTING AND CULTIVATING MACHINE.—Nicholas Whitehall, Newtown, Ind.—The object of this invention is to provide a machine capable of planting and cultivating corn or other grain planted in a similar way, which may be readily adjusted to the condition of a planter or cultivator.

NAIL MACHINE.—F. Davison, Richmond, Va.—The object of the present invention is to provide an improved feeding apparatus, whereby the plates will be self-actingly fed in succession from a feed box containing a number of plates; also, an improved arrangement of vibrating feeding apparatus whereby the plates are so presented as to ensure the disposing of a sufficient amount of metal at the wide ends of the blanks and delivery of them to the griping dies to form the heads which are alternately on opposite sides of the griping dies; also an improved arrangement of carrier guides for conveying the blanks from the cutters to the griping dies.

PRESSES FOR COTTON AND OTHER SUBSTANCES.—John Simpson, Chester, S. C.—This invention consists in an arrangement of two followers to be moved toward each other by pinions working into toothed racks upon each end of the followers.

TACHYPODOSCAPH.—Jules Marie de la Rue, Nogent sur Marne, France.—This invention is composed, according to the use for which it is intended, of two, three, or more boats or floats, which are connected together by cross bars, and so held apart as to allow the driving paddle wheels to be fitted between them.

IMPLEMENT FOR HOLDING EARS OF CORN.—Wm. A. Morgan, Brooklyn, N. Y., and T. B. Mosher, New York city.—The object of this invention is to provide a device, by which boiled ears of corn can be conveniently held to the mouth so as not to soil the hands. The invention consists in the construction of a spring clamp, having two pointed jaws and a shank, the jaws having sufficient spring to cause them to fit and hold cobs of different lengths. The spring is also sufficient to prevent the cob from turning loose on the jaws.

EVAPORATOR.—Thomas and James M. Scantlin, Evansville, Ind.—This invention relates to certain improvements in sugar cane, and other evaporators, and has for its object to produce simple action and perfect satisfactory operation.

PLOW COUPLING.—Wm. Reck, Mendota, Ill.—This invention relates to a new device for connecting shovel plows and for allowing their adjustment apart. The invention consists in the use of connecting bars and a connecting clamp and stop.

CAR WHEEL.—C. Delafield, Castleton, and Frank G. Johnson, Northfield, N. Y.—This invention relates to improvements in car wheels, whereby it is designed to provide more elastic, durable, and cheaper wheels than those now in use. The invention consists in an improved construction of car wheels made of metal and wood.

REGULATING APPARATUS FOR WATER TANKS.—J. M. Crose, Lebanon, Ind.—This invention consists in a peculiar arrangement of valves, water recesses, a tilting bar, and balancing weights, in connection with the water tank and supply pump, to be set into motion by a float in the tank when the water falls too low, for closing an air passage to a constantly-moving pump by which the tank is supplied, to cause the said pump to work for filling the tank, and to be operated by the surplus water to cause the pump to cease working, as required by the supply of the water.

APPARATUS FOR BURNING HEAVY CLAY PIPES.—W. Wassall, Wellsville, Ohio.—This invention consists in a semi circular holder for the tube, arranged on rockers, pivoted or otherwise, and adapted for standing on end beside the tube which stands on a board or floor, so that the tube may be tilted into, or with the holder, as the latter is rotated on the rockers to turn the upper end down.

WASHING MACHINE.—Herman Carmer, Sonora, Cal.—This invention consists in an arrangement of a grooved rotating cylinder in a suitable tub and operating mechanism; also the same of a heating furnace for boiling or heating the water in the tub.

CHURN.—J. A. Ham and W. Carpenter, Jr., Barry, Mo.—The object of this invention is to provide an improved arrangement of means for operating a double churn dasher, or agitator, in opposite directions simultaneously: also for removing the operating machinery where access to the interior of the churn is desired.

COMBINED TURN AND SUBSOIL PLOW.—J. C. Gross, Goshen Hill, S. C.—This invention has for its object to improve the construction of the plow for which letters patent No. 27,636 were issued, March 27, 1860 (which letters patent were assigned to Mr. Gross, May 1, 1868), so as to make it simpler in construction, stronger, and more readily and conveniently adjusted for the various purposes to which it may be applied.

MACHINE FOR CUTTING TUBULAR PAPER BOXES.—Joseph Spooner and Ebenezer Spooner, New York city.—This invention has for its object to furnish an improved machine, by means of which tubular paper boxes may be cut from tubular paper rolls conveniently, rapidly, and accurately, and which shall be simple in construction, and easily and conveniently operated.

DITCH GAGE AND SCOOP.—David Gore, Carlinville, Ill.—This invention has for its object to furnish a simple and convenient gage and scoop for forming a groove in the bottom of open ditches for laying tiles, by means of which the groove may be formed accurately, and of the desired form and size, and at the same time at the desired grade.

AX.—Alden H. Jumper, Sunman, Ind.—This invention has for its object to improve the construction of the various kinds of axes, so as to make them more convenient and satisfactory in use.

SELF-WATERING SCRUBBING BRUSH.—A. D. Granger, Talbotton, Ga.—This invention has for its object to furnish a simple, convenient, and effective scrubbing brush, which shall be so constructed as to discharge water upon the floor while being used.

BRICK-PRESSING MACHINE.—J. F. M. Pollock, Manchester, England.—This invention has for its object to furnish an improved machine for pressing brick, which shall be simple in construction, effective in operation, and convenient in use.

ADJUSTABLE THILL COUPLING.—T. H. Andress, Sparta, N. J.—This invention has for its object to furnish an improved thill coupling, which shall be simple in construction, and easily and quickly adjusted to the distance apart of the thill or tongue irons to be attached, and which will hold them securely and safely in whatever position they may be adjusted.

COMBINED PLANER AND CULTIVATOR.—James A. Currie, Xenia, Ohio.—This invention has for its object to furnish a simple, convenient, strong, and effective machine, which shall be so constructed and arranged that it may be readily adjusted for use as a planter or cultivator, doing its work equally well in either capacity.

POTATO DIGGER AND PICKER.—H. M. Smith, Long Branch, N. J.—This invention has for its object to furnish an improved potato digger, which shall be strong, simple in construction, and effective in operation, and which shall, at the same time, screen the potatoes and deposit them in a basket, or other receptacle, suspended at the rear of the machine.

COTTON SEED AND CORN PLANTER.—John G. B. Gill, Chestnut Grove, S. C.—This invention has for its object to furnish a simple and convenient machine, which shall be so constructed and arranged that it will be readily adjusted for planting corn or cotton seeds, or for distributing fertilizers, may be desired.

SYRINGE.—James F. McMillan, Mansfield, Ohio.—This invention relates to a new and useful improvement in syringes, to be used in the practice of medicine and surgery.

WEIGHING SCALES.—John Decker, Sparta, N. J.—This invention relates to a new and useful improvement in scales for weighing, more especially designed for domestic use, and the invention consists in a balance beam, or bar, so marked or graduated that it serves as a measure, and so that each inch indicates one pound weight.

DOUBLE WINDOW.—Stephen, Earl of Mount Cashell, Moore Park, Ireland.—This invention relates to improvements in the windows of dwelling houses and public buildings, whereby the same are made much more effective in excluding cold air in the winter season, as well as insects and reptiles in the summer season, than the ordinary window.

STRAINER AND CUT-OFF FOR CISTERNS.—Samuel Ayres, Danville, Ky.—This invention relates to a new apparatus for straining the water running from a roof into a cistern, and for cutting it off, when it is to be conducted into a garden, or some other place, or to prevent overflowing of the cistern.

GARDEN PLOW.—W. F. Pagett and S. H. Gard, Springfield, Ohio.—The object of this invention is to provide for public use a simple and easily-adjustable instrument to be propelled by hand, which shall answer the purpose of a garden plow or scraper.

VEHICLE.—B. N. Carpenter, Mt. Jackson, Va.—This invention consists in providing, upon the under side of the bar which couples the forward and rear axles of a wagon, and longitudinally of the same, two or more friction rollers, against which the triangular frame, that forms the rear part of the tongue, may play, as the forward axle turns to one side or the other, the arrangement taking the place of a fifth wheel.

WASHING MACHINE.—J. W. Myers, Lyons, Iowa.—The object of this invention is to provide a simple, cheap, and efficient washing machine for washing clothes, and it consists in an arrangement of horizontal grooved rubbing disks, a tub, and operating mechanism.

RIGGING VESSELS.—E. W. Brown, Cambridge, Ill.—This invention consists in an arrangement of vertical rollers around the mast and rigging for spreading the sails, which are connected to the said rollers by drawing them outwardly along the spars as they are unwound from the said rollers, and taking them in by an opposite movement.

ICE CREAM FREEZER.—Wm. Hawkins, Oregon, Mo.—This invention consists in so arranging the cream holders, and the beaters therein, that both shall be rotated, but in opposite directions, and providing the holder with exterior ribs, to keep the ice in motion, and thereby withdraw the heat more rapidly from the cream; also, in other details of construction.

NAIL MACHINE.—John Coyne, Allegheny city, Pa.—This invention relates to improvements in cut-nail machines, designed to provide an arrangement whereby the nippers will be prevented from opening before the gripers do, when the griping cam becomes worn, and, consequently, lengthened in the part which holds the gripers together, thereby holding them in contact longer than when in the original and correct form.

SCREEN PUNCHING MACHINE.—J. Wellington Nesmith, Black Hawk, Colorado.—This invention consists in improved arrangements of a punching roller and grooved roller between which the sheet is passed to be punched, whereby they may be varied, to punch finer or coarser holes; also, whereby the sheet may be readily inserted and removed, so as not to punch the border. The said invention also consists in an improved construction of the punching roller.

TREATING FARINACEOUS SUBSTANCES.—John J. Ridge, St. Johns, England.—This invention consists in subjecting the said farinaceous substances to a roasting or drying process while contained within closed vessels or chambers, surrounded by and maintained under heat, uniformly, for about six hours, to the temperature of boiling water, steam, or otherwise, suitable outlet pipes or passages in the apparatus being provided for the escape of the vapor or gases evolved during the process, the ingredients thus prepared are then to be mixed or incorporated with other substances of an alkaline or saccharine nature in such proportions as may be found necessary for allaying acidity, or otherwise rendering the same soothing or agreeable to the palate. The invention also comprises an improved apparatus for treating the said substances.

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Patent Solicitors, No. 37 Park Row, New York.

94,170.—INGOT MOLD.—George Abel and John Peddler, Temperanceville, Pa.

94,171.—REST FOR LOCOMOTIVE CROSS HEADS.—S. A. Alexander and Edward Dunn, Sunbury, Pa.

94,172.—COMBINED LATCH AND LOCK.—J. H. Allen and John Schwab, Louisville, Ky.

94,173.—ANIMAL TRAP.—James W. Bagby, Northcutt's Store, Ky.

94,174.—HORSE HAY FORK.—William D. Ballard, Davidsburg, Mich.

94,175.—GUIDE FOR SEWING MACHINE.—Menzo M. Benster, Detroit, Mich.

94,176.—CHURN.—George Berkstresser, Bedford, Pa.

94,177.—FLAX BRAKE.—A. G. Bill, Cuyahoga Falls, Ohio.

94,178.—PRINTING TELEGRAPH.—John Blackie, New York city.

94,179.—SPRING SEAT FOR CHAIRS, CARS, CARRIAGES, ETC.—J. D. Bonney, Pembroke, Mass.

94,180.—REEL AND SWIFT.—M. V. Brigham, Mannsville, N.Y.

94,181.—VEGETABLE WASHER.—Jacob Bump, Hartford, N.Y.

94,182.—CLOTHES DRYER.—F. R. Butler (assignor to himself and L. R. Welles), Rocky Hill, Conn.

94,183.—BUTTON OR STUD.—John B. Carter, Hartsville, Ind.

94,184.—SKATE.—S. P. Castle (assignor to O. H. Castle), Urbana, Ohio. Antedated Aug. 14, 1869.

94,185.—MARKER FOR CORN GROUND.—Oliver H. Catey, Williamsburg, Ind.

94,186.—BEEHIVE.—David Collom, Tallmadge, Ohio.

94,187.—SEWING MACHINE.—Job A. Davis, Watertown, N. Y.

94,188.—KILNS FOR DRYING BRICKS.—E. C. Dean, Henry Hamilton, G. P. Tenney, and A. T. Putnam, Detroit, Mich.

94,189.—MACHINERY FOR CUTTING MATCH STICKS.—François de Bowens, Philadelphia, Pa.

94,190.—PUMP.—Alexander Dixon, Aurora, Ill., assignor to himself and J. J. Hall.

94,191.—SEA DRAG.—Jacob Edson, Boston, Mass.

94,192.—GAS STOVE.—I. N. Elwell, Flint, Mich.

94,193.—COOKING STOVE.—M. G. Fagan, Troy, N. Y.

94,194.—MACHINE FOR MAKING CUT NAILS.—D. J. Farmer, Wheeling, W. Va.

94,195.—FENCE POST.—Daniel Fisher, Fair Haven, Ohio.

94,196.—MACHINE FOR BOARDING AND GRAINING LEATHER.—L. A. Gignac, Troy, N. Y.

94,197.—CURRIER'S KNIFE.—L. A. Gignac (assignor to himself and P. Pollock), Troy, N. Y.

94,198.—ELECTRO-MAGNETIC ALARM FOR RAILROAD CARS.—Webster Gillett, Ypsilanti, Mich.

94,199.—FENCE.—James Godfrey, Allegheny City, Pa.

94,200.—LATHE FOR TURNING HUBS.—Andrew Goodyear, Albion, Mich.

94,201.—MACHINE FOR SHAPING HUBS.—Andrew Goodyear, Albion, Mich.

94,202.—SHRUB AND FLOWER BOX.—Gustaf Gustafson, Oakland, Cal.

94,203.—VENTILATOR.—Geo. Hayes, New York city.

94,204.—METHOD OF SEASONING AND PRESERVING WOOD.—Theodore William Heinemann, New York city. Antedated August 17, 1869.

94,205.—MACHINE FOR ROUNDING THE CORNERS OF SLATE FRAMES.—Robert Heneage and Albert Storer, Buffalo, N. Y.

94,206.—MANGLE.—Peter Henry Hink and Herrmann Kaack, Moline, Ill.

94,207.—SPRING BED BOTTOM.—C. Hogeboom, M. Hogeboom, and L. Van Vleck, Winslow, Ill.

94,208.—APPARATUS FOR RE-JEWELING WATCHES.—C. Hopkins, Philadelphia, Pa. Antedated Aug. 19, 1869.

94,209.—LOW-WATER INDICATOR.—G. M. Hopkins and J. A. Straight, Albion, N. Y. Antedated Aug. 17, 1869.

94,210.—METALLIC CARTRIDGE.—B. B. Hotchkiss, New York city.

94,211.—APPARATUS FOR FLUTING AND QUILLING.—Geo. R. Houghton, Flint, Mich.

94,212.—SEWING MACHINE FOR WORKING BUTTONHOLES.—Edmund Howard, Flushing, and W. H. Jackson, Brooklyn, N. Y.

94,213.—CRIMPING BRAKE.—Jarvis Howe, Milford, Mass. Antedated Aug. 21, 1869.

94,214.—MANUFACTURE OF CARBONATE OF LEAD, ACETATE OF COPPER, AND ACETATE OF IRON.—Otto Jacobi, Philadelphia, Pa.

94,215.—VELOCIPEDE.—S. H. Jennings, Deep River, Conn.

94,216.—COAL-BREAKING MACHINE.—John Jones, Chestnut House, Stratford, and S. P. Bidder, Jr., Hillfield, Mitcham, England. Patented in England, Nov. 17, 1863.

94,217.—STUMP EXTRACTOR.—J. A. Kausler and H. B. Cook, White Pigeon, Mich.

94,218.—STOPPING MECHANISM FOR KNITTING MACHINE.—John Kennedy, Claverack, N. Y.

94,219.—APPARATUS AND PROCESS FOR OBTAINING LIGHT FROM GAS AND OIL.—Joshua Kidd, New York city.

94,220.—PRINTERS' INK.—Camille Krejci, Scranton, Pa.

94,221.—LOTION FOR THE DESTRUCTION OF INSECTS.—Daniel Leibert, Washington, D. C.

94,222.—ALARM ATTACHMENT FOR STILLS.—J. C. Leistner, Cincinnati, Ohio.

94,223.—BASE-BURNING STOVE.—M. W. Lester, Chicago, Ill.

94,224.—HOT-AIR FURNACE.—M. W. Lester, Chicago, Ill.

94,225.—MACHINE FOR MAKING HORSESHOES.—W. W. Lewis, Cincinnati, Ohio.

94,226.—STEAM GENERATOR.—Herman W. Luders, Philadelphia, Pa.

94,227.—PASTRY ROLLER.—H. S. Maltby, Cincinnati, Ohio.

94,228.—PROCESS OF PREPARING WOOD FIBER FOR PAPER STOCK.—G. E. Marshall, Laurel, Ind.

94,229.—TRACE BUCKLE.—J. H. Martin, Columbus, Ohio.

94,230.—HAMES FASTENER.—J. T. McDivit, Fayetteville, Ohio.

94,231.—STEAM ENGINE VALVE.—J. D. Moon and J. T. Foster, Jersey City, N. J.

94,232.—MACHINERY FOR MAKING AXES.—H. D. Morris, Baldwinsville, N. Y.

94,233.—RACK FOR SUGAR, CREAM, SALT, ETC.—M. A. S. Mullin, Osgood, Ind.

94,234.—FLYING-HORSE MACHINE.—G. L. Newhall and J. F. Cummings, Chelmsford, Mass.

94,235.—LIQUID METER.—Chas. Nida, Greenville, N. J.

94,236.—PRESERVE JAR.—T. G. Otterson, Camden, N. J.

94,237.—MINCING MACHINE.—W. H. Pierce, Bangor, Me.

94,238.—FENCE.—S. M. Prentice, Aurora, Ill.

94,239.—LATHE CHUCK.—John Rich, Painesville, Ohio.

94,240.—UMBRELLA.—H. T. Robbins, Boston, Mass., assignor to Ellis, Knapp & Co., New York city.

94,241.—PIPE WRENCH AND PIPE CUTTER.—A. Robes, Somerville, and J. C. Chapman, Cambridgeport, Mass.

94,242.—SHIPS' FENDERS.—W. D. Robinson, Buffalo, N. Y.

94,243.—EXTENSION TABLE SLIDE.—Otis E. Sanford, La Porte, Ind.

94,244.—CROUT CUTTER.—J. G. Schwarz, Indianopolis, Ind., assignor to himself and J. G. Brand.

94,245.—VENTILATOR.—W. T. Sears and Wm. Edson, Boston, Mass., assignor to W. T. Sears.

94,246.—PROCESS FOR EXTRACTING OILS, ETC.—C. A. Seeley, New York city.

94,247.—SHEAR.—R. H. Seymour (assignor to Henry Seymour and Co.), New York city.

94,248.—FRUIT JAR.—H. E. Shaffer, Rochester, N. Y.

94,249.—EVAPORATOR.—A. W. Shidler, South Bend, Ind.

94,250.—WASHING MACHINE.—D. Smallwood, Middletown, Ohio.

94,251.—HARVESTER CUTTER.—J. S. Smith and John Coder, Swanton, Ohio.

94,252.—HUSK MAT.—J. P. Smucker, Ashland, assignor to himself and R. S. Owen, Bryan, Ohio.

94,253.—PRESS FOR CASTING METAL.—J. B. Tarr, Fairhaven, Mass. Antedated Aug. 25, 1869.

94,254.—LUBRICATOR FOR VENTILATOR.—Hugh Thomas New York city. Antedated Aug. 18, 1869.

94,255.—HANGING CIRCULAR SAWS.—Charles R. Tompkins, Rochester, N. Y.

94,256.—STONE-CHANELING MACHINE.—Frederick Townsend Albany, N. Y.

94,257.—PRESS.—I. H. Trabue, Livingston county, Ky.

94,258.—SEEDING MACHINE.—W. A. Van Brunt, Horicon Wis.

94,259.—WATER WHEEL.—Henry Van De Water, Attica, N. Y.

94,260.—DEVICE FOR FILLING STEAM GENERATORS.—Charles Ward, Detroit, Mich.

94,261.—WRENCH.—Walter Ward, Mount Holly, N. J.

94,262.—FENCE.—Thomas Westermann, Clinton township, Pa.

94,263.—MEANS FOR PUTTING UP AND USING POWDERS.—A. P. Willard, Battle Creek, Mich.

94,264.—MODE OF REMOVING STUMPS.—Henderson Willard (assignor to himself and Joseph Walker), Grand Rapids, Mich.

94,265.—GRAIN BIN.—C. D. Woodruff (assignor to himself and Wm. Krauss), Toledo, Ohio.

94,266.—CLAMP SCREW FOR CALLIPERS, ETC.—Daniel Wright, Jr., Waltham, Mass.

94,267.—THILL COUPLING.—T. H. Andress (assignor to himself and John Decker), Sparta, N. J.

94,268.—CLOD FENDER.—Daniel Applegate, Noblesville, Ind.

94,269.—VAPOR BURNER.—Wm. Aurich, Chicago, Ill.

94,270.—FASTENING FOR BREASTPINS.—Samuel Ayres, Danville, Ky.

94,271.—RAIN-WATER STRAINER AND CUT-OFF.—S. Ayres, Danville, Ky.

94,272.—BRIDGE.—Calvin Baker, St. Joseph, Mo.

94,273.—APPARATUS FOR PRESSING AND VULCANIZING INDIA-RUBBER.—Joseph Banigan, Woonsocket, R. I., assignor to the Woonsocket Rubbber Company.

94,274.—PERMUTATION PADLOCK.—Tracy Beadle and W. P. Yates, Elmira, N. Y.

94,275.—SPRING-WAGON SEAT.—J. I. Bear, Decatur, Ill.

94,276.—METHOD OF MAKING SQUARE-NECKED BOLTS.—Geo. C. Bell, Buffalo, N. Y.

94,277.—FURLING AND REEFING SAILS.—E. W. Brown, Cambridge, Ill.

94,278.—JACK FOR SPINNING.—W. H. Brothers (assignor to himself and Elisha Allen), Winooski, Vt.

94,279.—REVOLVING SPRING TOY GUN.—Charles Bunge, Geneva, N. Y.

94,280.—FERRULE.—S. N. Chapin, New Britain, Conn.

94,281.—TURBINE WATER WHEEL.—J. E. Chapman, West Reading, Conn. Antedated Aug. 19, 1869.

94,282.—FIRE AND BURGLAR ALARM.—J. L. Cheston, South Easton, Pa.

94,283.—BAG HOLDER.—J. N. Collins, Menasha, Wis.

94,284.—WOODEN PAVEMENT.—Chas. C. Converse, Biooklyn, N. Y., assignor to S. S. Greeley.

94,285.—MACHINE FOR CUTTING NAILS.—John Coyne, Allegheny City, Pa.

94,286.—APPARATUS FOR THE MANUFACTURE OF PIG-BLOOM.—John Coyne, Allegheny City, Pa.

94,287.—WASHING MACHINE.—Hermann Carmer, Sonora, Cal.

94,288.—TANK REGULATOR.—J. M. Crose, Lebanon, Ind.

94,289.—COMBINED PLANTER AND CULTIVATOR.—J. A. Currie, Xenia, Ohio.

94,290.—NAIL MACHINE.—F. Davison, Richmond, Va.

94,291.—ROCK CRUSHING MILL.—J. H. Day, Walla Walla, Washington Territory.

94,292.—COMBINED WEIGHING AND MEASURING SCALE.—J. Decker, Sparta, assignor to himself and E. De Camp, Boonton, N. J.

94,293.—RAILWAY CAR WHEEL.—Clarence Delafield, Castleton, and F. G. Johnson, Northfield, N. Y.

94,294.—FLOATING VELOCIPEDE.—Jules Marie de la Rue, Nogent Sur Marne, near Paris, France. Patented in France, December 14, 1868.

94,295.—LAMP.—J. A. Dew (assignor to himself and O. A. Bogue), Chicago, Ill.

94,296.—PLOW CLEVIS.—Thos. Dow, Yorktown, Ill.

94,297.—MANUFACTURE OF ILLUMINATING GAS.—C. F. Dunderdale, New York city.

94,298.—APPARATUS FOR PURIFYING SACCHARINE LIQUIDS, AND FOR CURING, DRYING, AND TREATING SUGAR AND OTHER MATERIALS.—W. B. Espent, Spanish Town, Jamaica.

94,299.—RUFFLING ATTACHMENT FOR SEWING MACHINES.—J. O. Fairbairn, Milwaukee, Wis.

94,300.—POCKET LAMP.—A. P. Foster and D. B. H. Bartlett (assignors to themselves and C. F. Howe), Lowell, Mass.

94,301.—COTTON SEED AND CORN PLANTER.—J. G. B. Gill, Chestnut Grove, S. C.

94,302.—PEAT MOLD.—Kingston Goddard, Richmond, N. Y.
94,303.—DITCH GAGE SCOOP.—David Gore, Carlinville, Ill.
94,304.—MACHINE FOR LINTING AND RELINTING COTTON SEEDS AND MOTES.—G. W. Grader (assignor to himself and W.B.Wiggs), Memphis, Tenn.
94,305.—SELF-WATERING SCRUBBER.—A. D. Granger, Talbotton, Ga.
94,306.—FURNACE FOR PRODUCING IRON DIRECT FROM THE ORE.—Wm. Griffith, Jr. (assignor to himself, J. S. Patterson, and T. C. Zulick), Pottsville, Pa.
94,307.—COMBINED TURN AND SUBSOIL PLOW.—J. C. Gross, Goshen Hill, S. C.
94,308.—GRAIN DRYER.—Remig Grotz, Chicago, Ill.
94,309.—SLATE-POLISHING MACHINE.—Stinson Hagaman, Weissport, Pa.
94,310.—SLATE-POLISHING MACHINE.—S. Hagaman, Weissport, Pa.
94,311.—CHURN.—J. A. Ham and W. Carpenter, Jr., Barry, Mo.
94,312.—CHURN.—J. A. Hanger, Staunton, Va.
94,313.—ICE-CREAM FREEZER.—William Hawkins, Oregon, Mo.
94,314.—WATER WHEEL.—Jacob Hepperly, Peoria, Ill.
94,315.—DUMPING WAGON.—Britain Holmes, Buffalo, N. Y.
94,316.—STEAM-ENGINE VALVE GEAR.—Chas. S. Inslee, New York city, and W. H. Inslee, Newark, N. J.
94,317.—CUE-LEATHER TRIMMER.—L. A. Johnson, H. W. Collender, and J. E. Boyle (assignors to Michael Phelan, H. W. Collender, and J. E. Boyle), New York city.
94,318.—AXE.—A. H. Jumper, Sunman, Ind.
94,319.—HORSE HAY FORK.—Nathan W. Kingsley, Swansea, Mass.
94,320.—BASE-BURNING FIREPLACE HEATER.—Philip Klotz (assignor to B. C. Bibb), Baltimore, Md.
94,321.—BRIDGE.—John Laird, Canton, Ohio.
94,322.—BRIDGE.—John Laird and G. F. Laird, Canton, Ohio.
94,323.—FLASK FOR CASTING DENTAL PLATE.—Samuel Lawrence (assignor to himself and Ambrose Lawrence), Lowell, Mass.
94,324.—COMPOSITION FOR MOLDS AND MODELS IN CASTING DENTAL PLATES AND OTHER ARTICLES.—Samuel Lawrence (assignor to himself and Ambrose Lawrence), Lowell, Mass. Antedated August. 24, 1869.
94,325.—CARRIAGE WHEEL.—Obed Look, Bridgeport, Conn.
94,326.—HARROW.—Isaac Low, East Fairfield, Ohio.
94,327.—COOKING STOVE.—Charles McClain, Carlyle, Ill.
94,328.—SYRINGE.—J. F. McMillen, Mansfield, Ohio.
94,329.—PRINTING TELEGRAPH.—Charles T. Moore, White Sulphur Springs, West Va.
94,330.—HOT-CORN HOLDER.—W. A. Morgan, Brooklyn, N. Y. and T. B. Mosher, New York city.
94,331.—DOUBLE WINDOW.—Steven, Earl of Mount Cashell, Moore Park, Ireland.
94,332.—WASHING MACHINE.—J. W. Myers, Lyons, Iowa.
94,333.—MACHINE FOR PUNCHING METAL SCREENS.—J. W. Nesmith, Black Hawk, Colorado Territory.
94,334.—COTTON CHECK.—S. W. Odell, Ouachita parish (assignor to himself and John Nixon), New Orleans, La.
94,335.—SEAT FOR SCHOOLS, HALLS, CHURCHES, ETC.—Harrison Ogborn, Richmond, Ind. assignor to Aaron Chandler, Davenport, Iowa.
94,336.—SKATE RUNNER.—P. A. Peer, Kalamazoo, Mich.
94,337.—BRICK MACHINE.—Julius F. M. Pollock, Manchester, England.
94,338.—PUMP.—A. N.Putnam, Antrim, N. H.
94,339.—PLOW COUPLING.—William Reck, Mendota, Ill.
94,340.—WAGON STANDARD.—George Richards, Richland Centre, Wis.
94,341.—PROCESS AND APPARATUS FOR TREATING FLOUR, MEAL, AND OTHER FARINACEOUS SUBSTANCES.—J. J. Ridge, St. Johns, Southwark, England.
94,342.—PUDDLING FURNACE.—J. B. Robinson, Duncansville, Pa.
94,343.—EVAPORATOR FOR SUGAR, AND OTHER LIQUIDS.—Thomas Scantlin and James M. Scantlin, Evansville, Ind.
94,344.—WINDOW.—George Shatswell, Waukegan. assignor to himself, Parne l Manson, and Charles L. Sampson, Chicago, Ill.
94,345.—HOLLOW GRATE BAR.—Noah Shaw, West Eau Claire, Wis., assignor to himself, J. F. Moore, W. M. Lee, and A. B. Alden.
94,346.—MACHINE FOR UPSETTING TIRES.—Elias Shopbell, Ashland, Ohio.
94,347.—HAY AND COTTON PRESS.—John Simpson, Chester, S. C.
94,348.—CLEVIS.—Zachariah B. Sims, Bonham, Texas.
94,349.—COTTON PLOW AND PLANTER.—Z. B. Sims, Bonham, Texas.
94,350.—COTTON PLOW.—Z. B. Sims, Bonham, Texas.
94,351.—COTTON PLOW.—Z. B. Sims, Bonham, Texas.
94,352.—COTTON PICKER AND CLEANER.—Z. B. Sims, Bonham, Texas.
94,353.—COTTON HOE.—Z. B. Sims, Bonham, Texas.
94,354.—STALK AND CANE PULLER.—Z. B. Sims, Bonham, Texas.
94,355.—THREE HORSE EQUALIZER.—Z. B. Sims, Bonham, Texas.
94,356.—POTATO DIGGER.—H. M. Smith, Long Branch, N. J.
94,357.—MOTH-PROOF LINING.—J. R. Smith, Chicago, Ill.
94,358.—TUBULAR PAPER BOX CUTTER.—Joseph Spooner and Ebenezer Spooner, New York city.
94,359.—MODE OF BLEACHING GRANULATED SUGAR.—T. C. Taylor, Philadelphia, Pa. Antedated August 20, 1869.
94,360.—APPARATUS FOR CARBURETING AIR AND GAS.—Oakes Tirrill, Boston, Mass.
94,361.—SHAFT AND POLE HOLDER.—J. S. Totten, Lebanon, Ohio.
94,362.—FLOATING VELOCIPEDE.—V. B. Townsend, Worcester, Mass.
94,363.—SHUTTER FASTENING.—B. D. Washburn, Boston, Mass.
94,364.—APPARATUS FOR TURNING HEAVY CLAY PIPES.—William Wassal, Wellsville, Ohio.
94,365.—PLANTER AND CULTIVATOR.—Nicholas Whitehall, Newtown, Ind.
94,366.—PLOW.—Edward Wiard (assignor to B. F. Avery), Louisville, Kentucky.
94,367.—PLOW.—Edward Wiard (assignor to B. F. Avery), Louisville, Kentucky.
94,368.—EMBOSSING PRESS.—J. M. Wilbur, Cleveland, Ohio.
94,369.—HOSE PIPE NOZZLE.—Archibald Williscroft, Wilmington, Del.
94,370.—MILL STONE BALANCE.—G. W. Wilson (assignor to himself and Horace Franc sco), Tojono, Ill.
94,371.—STEAM ENGINE PISTON.—Richard Witty, Chicago, Ill.
94,372.—CARRIAGE HUB—A. S. Woodward (assignor to himself and H. A. Parker), Pepperell, Mass.
94,373.—APPARATUS FOR COOLING AND REFRIGERATING.—John Agate, Pittsford, N. Y.
94,374.—ROASTING AND TREATING IRON ORES.—Henry Aitkin, Falkirk, Scotland.
94,375.—ARTICLE OF FOOD FROM PUMPKIN AND SQUASH.—E. W. Ayer and M. C. Ayer, South Waterford, Me.
94,376.—CHUCK.—W. F. Bacon, Skowhegan, Me.
94,377.—STEAM HEATER.—A. C. Baker, Westfield, Mass.
94,378.—WASH BOILER.—Oren Baldwin, Keokuk, Iowa.
94,379.—LINIMENT.—J. M. Barrett, Plymouth, N. C.
94,380.—GLOVE.—Orson Bartlit and J. D. Edson, Rockford, Ill.
94,381.—CHURN.—N. S. Barton, Mannsville, N. Y.
94,382.—TOE PLATE FOR BOOTS AND SHOES.—George Beatty, Cleveland, Ohio.
94,383.—PLOW.—J. C. Bell, Lebanon, Ind.
94,384.—NEEDLE FOR SEWING MACHINE.—J. B. Blanchard, Boston, Mass
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71,313.—SELF-LUBRICATING JOURNAL BOX.—Dated November 26, 1860; reissue 3,623.—Lane and Bodley (assignees of Philander P. Lane), Cincinnati, Ohio.
56,345.—CORSET SPRING.—Dated July 17, 1866; reissue 2,929, dated May 12, 1868; reissue 3,529, dated June 29, 1869; reissue 3,624.—Frances Lee Barnes, New York city, executrix of the estate of Samuel H. Barnes, deceased.
75,390.—LAMP SHADE.—Dated March 10, 1868; reissue 3,625.—George Doolittle and George H. Diamond, Bridgeport, and Thomas Wallace, Jr., Ansonia, Conn., assignees, by mesne assignments of T. B. Doolittle.
59,595.—WHEAT DRILL.—Dated November 13, 1866; reissue 3,626.—James F. Harcourt, Moscow, Ind.
61,953.—HARVESTER.—Dated February 12, 1867; reissue 3,627.—Ætna Manufacturing Company, Salem, Ohio, assignees of Amos Rank.
52,341.—WAGON WHEEL.—Dated January 30, 1866; reissue 3,628.—John Thrasher, Albion, Mich.
10,722.—FIBER FROM CANE FOR PAPER AND FOR OTHER PURPOSES.—Dated April 4, 1854; extended seven years; reissue 2,973, dated June 9, 1868; reissue 3,629.—Kate Lowe and William McTeer, Baltimore, Md., assignees, by mesne assignments, of Benjamin A. Lavender and Henry Lowe.

DESIGNS.

3,639 to 3,642.—FLOOR OILCLOTH.—Hugh Christie, Morrisania assignor to Deborah Powers, Albert E. Powers, and Nathaniel B. Powers, Lansingburg, N. Y. Four patents.
3,643.—FUR COLLAR.—Isaac Lewine, New York city.
3,644.—PRINTING TYPE.—Andrew Little, New York city.
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3,649.—ELEVATED OVEN RANGE.—Philip Rollhaus, Port Chester, N. Y.
3,650 to 3,652.—ORNAMENT FOR A CHILD'S HAT.—John Sealy, Jr., Newark, N. J. Three patents.
3,653.—STOVE.—Alexander White, Genesco, Ill.

APPLICATIONS FOR EXTENSION OF PATENTS.

MODE OF HANGING THE SCREENS IN WINNOWING MACHINES.—John A. Krake, of Alden, N.Y., has petitioned for the extension of the above pateat. Day of hearing, November 8, 1869.

MACHINE FOR CHANNELING STONE.—John Taggart, of Melrose, Mass., has applied for an extension of the above patent. Day of hearing November 15, 1869.

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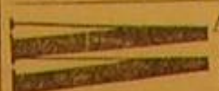

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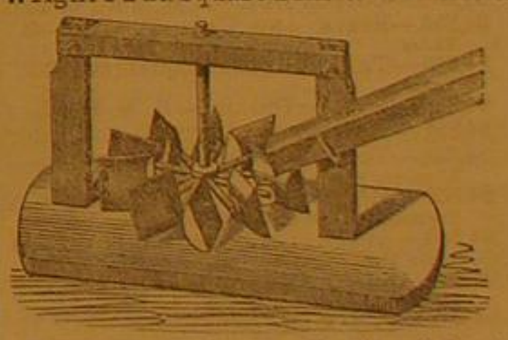

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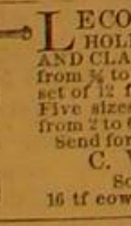

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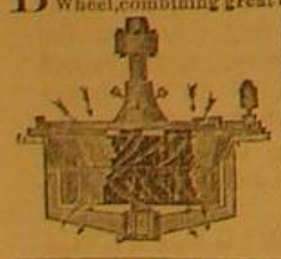

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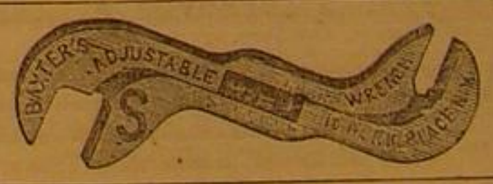

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